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AT THE BEGINNING OF THE SCHOOL YEAR

The day of opening school is the teacher's real new year's day. INDUSTRIAL ARTS AND VOCATIONAL EDUCATION therefore, takes this occasion to wish all of its readers a bon voyage through the laborious journey which lies ahead of them in the school year 1932–33.

There are many things that could improve and it is the sincere wish of everyone connected with this magazine that every one of its readers will experience increasing happiness as the school year advances.

FOR FUTURE RECORD

If you have changed your position or your address, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION would be glad to get the information. We aim to keep our lists up to date but can only do this with the coöperation of our readers.

We also invite you to send us news items about your work and department during the coming school year.

THIS MONTH'S COVER

The cover picture this month shows a huge blooming mill.

The red-hot six-ton ingot is transferred from the open hearth furnace at a comparatively high rate of speed. The long thick section which is produced as the ingot passes through the rolls (the upper right-hand insert gives some idea of their huge size) is called a bloom, hence this type of mill is called a blooming mill.

Photo courtesy American Steel & Wire Co., Chicago, Illinois.

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The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

The Safety Lathe that . . . . Modern Instruction Demands

STUDENTS like to feel that they are learning a trade with machines such as they will use in actual work after they leave school, and instructors too are equally interested in using such tools in their class work. Furthermore they demand machines that are easy to adjust and operate and offer as much protection to the students as it is compatible with the work they do.

In the new T-12 SPEED LATHE we have combined skillful design and accurate workmanship,—essential requisites of the machinery intended for industrial plants,—and the simplicity of adjustment, the ease of operation and the safety features demanded by progressive instructors of our vocational and manual training schools.

Safety Features

1. *Motor cannot be accidentally started by moving the speed control lever.*
2. *Motor will start only when control lever is at lowest speed position and start button is pushed.*
3. *Top of push button is slightly below surface to prevent accidental starting.*
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5. *Tool rest is universally adjustable with clamp lever in front, convenient to operator.*
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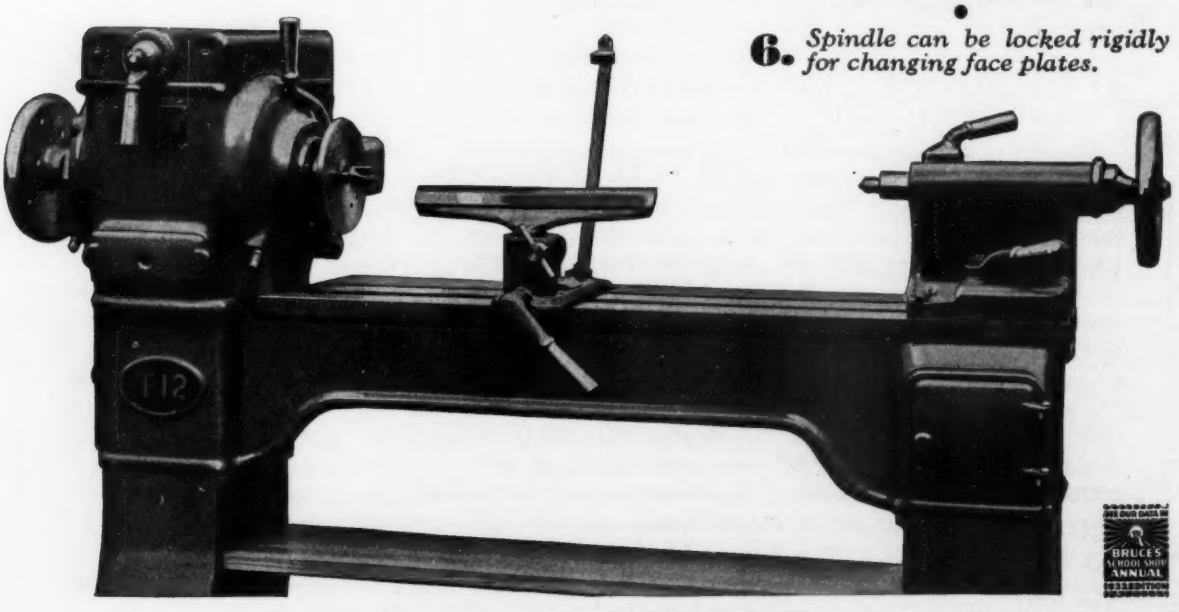

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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The Selection of Textbooks for Vocational Schools

*William T. Wyman**

IN scanning through a recent educational magazine the writer ran across an assertion that the textbook is slated for the educational scrap pile along with the hickory stick and the learned-by-heart recitation. It is granted that persuasion is more potent than punishment; that socialized discussion is more efficient than memorized recitation; but it is quite safe to say that the textbook cannot be replaced. Instead of meeting the fate to which it would be consigned by the rocking-chair educator, the textbook will still be going strong when he is vainly striving to convince St. Peter that discarded fads and fancies should be given a retrial in the educational system of Heaven.

Nevertheless the textbook will keep its place in the sun only by dint of clear thinking and serious effort on the part of authors, publishers, and users. In common with all things educational the textbook is under fire from layman and educator. Up to the present there has been a gratifying effort to produce books fitted to the age and intelligence levels for which they are designed that can be used as efficient tools in the hands of students and teachers. Barring a limited number of outstanding exceptions however, the product of the presses for the past decade does not present convincing evidence of a skillfully executed plan of textbook making on the part of vocational authors. We still fall short of marketing a line of books that merits high score based on the tried-and-tested findings of modern scientific research in the field of adolescent psychology.

The last statement will probably draw fire from the authors of existing vocational texts. The writer is fully aware that he is treading on the toes of administrator-authors, college professors, and a number of fellow classroom teachers. The latter, however, in the past few years have injected a much-needed element of practicality into the making of texts that can be furnished only by the teacher-author who is himself actively engaged in the job of educating the growing boy.

But practicality alone will not bring vocational texts up to modern standards. The authors of this type of text must wake up, face the facts, and produce. If this article does nothing more than to arouse the teachers of shop subjects to the need of scientifically written textbooks, it will have accomplished its major objective. When we all catch the vision of the "new-type text" designed to pass the "new-type test" the demand will produce the book. When the publishers can be assured that we know what we want, they will be quick to scout for qualified authors who have prepared themselves, and an improved product will be the result.

This problem of textbook selection presents a situation the complexity of which is typical of the chaotic yet healthy stage of transition through which education is now passing. Scientific psychology of a practical sort is replacing traditional rule of thumb. Objective research is supplementing subjective opinion. The teaching process is being fitted to the learning process. Pupil interests are being studied. Individual differences are being allowed for. The selection of textbooks must keep pace with these trends.

The following discussion will confine itself at first to an analysis of the basic scientific principles underlying the art of textbook making. The specifications formulated will then be used as the groundwork for a series of objective tests for textbook choosing. This plan is based on the assumption that accurate and well-ordered knowledge of *making* is essential to intelligent *selecting*. The buyer must know the product. If he knows what he should find he will know what to look for.

Although the objectives set forth may appear too strongly utopian, we can reach higher levels of achievement only by constant aiming at the bull's-eye. The bull's-eye is utility. The utility of the textbook as a learning tool in the hands of a student is measured

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by the efficiency with which it aids him to instruct and to educate himself. To educate, it must stimulate him to think; to instruct, it must furnish him with facts. To accomplish these two major objectives any textbook must be carefully planned, compellingly interesting, technically accurate, and crystal-clear.

If a text is to function efficiently as just outlined, it must be scientifically designed, accurately stated, and skillfully written. Its plan must follow the laws of adolescent psychology; its interest factor must be high; its statements must be facts; and its structure must approach the literary classic.

Its author will be three men in one; a thorough psychologist, an expert in his subject, and a master of words. Psychology will assure plan and will secure interest; knowledge of subject will guarantee accuracy; aptness with words will secure clarity.

Well-balanced fusion of interest, accuracy, and clarity will most certainly produce a vocational text whose efficiency as a learning tool will prove of unquestioned utility.

Interest is Essential

Interest is vital. Without it attention lags. The discerning author will use every legitimate literary device to make his text interesting. His skill will make the facts speak for themselves. Attention compelled by interest need not interfere with rigorous thinking on the part of the student. On the contrary, a learning situation in which the interest factor is high will positively stimulate a flow of reasoning that could never be hoped for otherwise. There is no excuse for the dull in a textbook. Mental discipline for its own sake is dead and buried. As an adjunct to purposeful thinking it is very much alive and operative in the mind of the youthful learner. The vocational student will always rise to the challenge offered by a vigorously written text that appeals to his interest.

Securing and Maintaining Interest

The author who would interest his reader should write as he teaches. Handicapped, however, by the lack of gesture and sound, a textbook must utilize the following interest-getting factors to the fullest advantage. It must be organized according to a carefully designed plan; it must create learning situations with ingeniously worded questions that tie up with familiar life situations; it must appeal to the eye with an ample number of pictorial illustrations; and last but not least it must be written in a style that is clear, concise, and cogent.

The adolescent is keen to sense lack of plan in a text. Loss of confidence in such a text will inevitably dull his interest. Respect for the plan of a text will just as certainly sharpen his appetite for further studying.

A practical question that links the subject matter with the experience background of the reader operates through legitimate curiosity as a powerful interest-getter. A bare statement of fact, to be sure, will impress and convince; but an ingeniously worded question will galvanize the brain into action.

Eighty-seven per cent of a sale is made through the eye. A text without pictures is oftentimes as flat as a lecture on Borneo without film. The technical character of vocational texts necessitates the use of diagram, sketch, and halftone to aid the process of visualization.

A technical text can never hope to read like a novel but it can be written in a style that compels attention. Intensive practice in the acquisition of a vigorous style will most certainly produce a textbook that is interesting because it is clear, concise, and cogent.

The interest-maintaining power of plan, picture, question, and style is fundamental. Interest can be further heightened by a delicate adjustment of these factors to the age and intelligence level of the student.

In addition to this the attention of the faster boy will be held by extra-work features, such as advanced questions, problems, and collateral reading. A few self-scoring tests will also accomplish the same aim.

The idea, however, of painless absorption of learning through the motivation of interest alone is false. The discriminating vocational author will employ interest exclusively as a means of developing concepts, skills, and attitudes.

The type of textbook under discussion is to be used for study and reference. This excludes laboratory manuals, work-test books, and the like. The soundness of the plan of organization of such a text will depend largely on the accuracy with which the content is adjusted to the age-intelligence level of the prospective student-reader. The author's judgment should be guided by research and classroom experimentation rather than by personal opinion and current practice.

The author must concern himself with three factors that mutually contribute to the efficiency of the plan: the selection of suitable subject matter, its arrangement, and the choice of suitable methods of presenting it. In short, he must decide on what, when, and how.

Selecting the Subject Matter

The selection of suitable subject matter demands the use of a scale of values that discriminates sharply between the vital and the nonessential. Selection by rejection is the watchword. The content chosen must be factually accurate. It must pass the test of practical utility by describing and explaining actual life situations with which the student is already familiar or into which he will be thrown after leaving school. The author must skillfully sift the tried-and-tested from the old and combine it with the worth-while from the new. The closely cloistered author has no place in this scheme. Allow a writer his chair, his reference books, and his table; but insist that he winnow his facts from the field of activity that the learner must eventually work in.

The amount of subject matter should be limited to basic principles and their applications. Foundation

rather than encyclopedic detail fits the learning needs of the adolescent. The selection of content for textbooks in woodworking, metal working, electricity, and the other industrial arts should follow this idea.

Arranging the Subject Matter

There is a natural order of topics for any subject. The determination of the arrangement of content for the shop subjects is a fruitful field for scientific experimentation. The author of a vocational text should pay scant attention to traditional and current order of topics. An examination of the tables of contents of representative texts will verify this statement. For this reason it is an author's job to determine the natural order of topics for his subject by experimental research with his own classes and by recourse to the findings of competent specialists in the same field.

Presenting the Subject Matter

In its capacity of substitute for a living teacher, the textbook should present the subject material by methods that in their versatility closely approximate actual classroom practice.

The familiar and time-proved devices, such as special emphasis, repetition, drill, review and summary; thought and problem-solving questions; and new-type tests need no discussion here. Existing literature thoroughly explains their function and utility.

The subject matter of a text can be most effectively presented by following a definite plan of progression and cycling. Short learning units, arranged in their natural order, are successively presented with the aid of the devices previously mentioned. These units are developed by a step-by-step process until the entire content of the subject has been woven into an intricate, but well-ordered pattern. In this process new concepts are first attacked from a bird's-eye point of view. Detailed variations of these fundamental concepts are then progressively developed by the well-known method of attack, rest interval, and reattack. Principles and their applications are cycled through the pattern of the text in a gradually ascending scale of comprehension difficulty.

Intensiveness of treatment will be adjusted to the degree of thought fixation demanded by the relative importance of the topics. The explanation of commonly recognized stickers or stumblingblocks must be handled with sufficient intensity and clarity to leave no doubt in the reader's mind of what it is all about.

The possibility of the formation of incorrect and interfering thought bonds must be carefully guarded against by the timely use of precautionary statements that will act as signals of danger ahead. For instance, in elementary electricity the beginner when asked to figure the equivalent resistance of several loads in parallel almost invariably *adds* the ohmic values unless expressly precautioned about this fallacy. He *thinks series* while attempting to *calculate parallel*.

The method of multiple-angle attack is another useful aid in the prevention of misconceptions and in the formation of accurate conceptions. This method is especially effective in putting a concept over against the resistance of multiple response offered by the various types of mind.

The modern text must make specific provision for individual differences especially in regard to the more gifted boy. This objective can be attained by the use of self-scoring new-type tests, numerical problems, thought questions, and suggestions regarding collateral reading and outside investigation. If these devices are properly graded for difficulty and if they offer ample variety, the stimulation of interest and independent thought on the part of the reader will well repay the author for any extra effort he puts into their preparation.

How Can Clarity Be Obtained in a Textbook?

Clarity is vital to understanding. Its achievement in a vocational text hinges primarily on three essential factors: adjustment of vocabulary, clearness of English, and vividness of pictorial representation. Although these features have already been discussed under interest-getting methods, they deserve reëmphasis here because of their value as contributors to clarity.

Clarity of vocabulary is absolutely essential to the absorption of ideas by the reader of a vocational textbook. Since the technical character of the subject matter requires the use of a special vocabulary that must be thoroughly mastered by the student before he can begin to comprehend the thought behind the words, the attempt to read such a text must seem like delving into a foreign language. Imagine trying to study electricity with a textbook written in French. The student cannot be expected to understand *ideas* if he is handicapped at the outset by a host of unintelligible *words*. Since the use of a technical dictionary while reading a vocational text is not practicable for most boys, the text itself must supply the definitions of technical terms as fast as they appear in the subject matter. A glossary or word list for each chapter can be used if parenthetical definitions or direct explanations are not favored. The use of these devices can be gradually tapered off as the reading level of the student matures.

The problem of adjustment of vocabulary level has been scientifically studied for years by research workers in the elementary-school subjects. Vocational teachers and authors can make their work much more effective by following the same procedure.

Adjustment of vocabulary should be backed by a clarity of phraseology that leaves no doubt in the reader's mind of the thought in the author's mind. Misunderstandings even between experts are of common occurrence due to faulty English. Technical concepts are difficult enough *per se*. It is the duty of a vocational text to reduce the chances of misconceptions to a minimum by making allowance for the immaturity of the adolescent reader.

Vividness of pictorial representation is just as essential as clarity of English. The picture as a medium of thought expression is even more powerful than the printed word. The diagram and sketch should be made to *talk*. A skillfully designed drawing can effectively replace the use of several hundred words. If the author of a vocational text is not an expert in graphics himself he should by all means engage the services of competent talent for the execution of his drawings. He should refrain from drawing his own or from turning the work over to some ambitious student or aspirant for a doctor's degree, unless the latter is especially gifted. In this connection we can take our lead from advertising art and from the better illustrated technical magazines. Their pictures tell their stories better than words. In these mediums the appeal to the eye is made through form, contrast, and color. Especially *color*. Need more be said?

Selecting the Vocational Text

The task of selecting a vocational textbook can be simplified and expedited by the systematic use of the objective tests outlined in the following questions. These tests are based on the principles of textbook making discussed in the preceding paragraphs. The suitability of the text under analysis can be judged by the fidelity with which it measures up to the standards imposed.

Since the art of vocational textbook making is still in the pioneering stage, it is idle to expect any current text to completely meet the specifications listed. To allow for this practical situation the test questions are grouped under two self-explanatory headings: *essential features* and *desirable features*. As the technique of vocational authors improves, we can expect to expand the essential-features list by additions taken from the desirable-features list.

It is suggested that the test questions be applied in rotation to a few carefully chosen key topics. For instance, in judging a text in elementary electricity the selector would determine how successfully the author had handled the following subjects: effects of electricity; series and parallel circuits; the energy concept; current, voltage, and resistance; Ohm's law; power; and safety.

Essential Features

In this group are listed the minimum requirements that should positively be satisfied by a vocational text to insure its adoption. Failure to score properly in these basic essentials should automatically throw the text out no matter how excellent it might be in other respects.

Vocabulary: Does the text employ a carefully graduated vocabulary?

Content: Is the subject matter *vital?* Is it closely connected with the experience background of the student and with vocational situations with which the student will come in contact when he goes into industry? Does the selection of subject matter confine itself to a minimum number of basically essential topics or does it resemble an encyclopedia?

Factual Accuracy: Is the subject matter technically accurate?

Pictorial Representation: Is the text copiously illustrated with carefully selected cuts and skillfully designed drawings? Is *color* used in a few diagrams where differentiation and contrast are aided by the color appeal? Are the diagrams and cuts self-explanatory by the sparing use of notes and labels or are the illustrations cluttered with a confusion of arrowheads, dotted lines, full lines, etc.?

Style: Is the style vigorous and conversational or is it stiff and pedantic? Is it clear, concise, and cogent?

Experiments: If the text treats an experimental subject, does it supplement explanations of principles with experiments actually described in the text? The soundness of the idea involved in this question is backed by the laws of adolescent psychology and does not preclude the supplementary use of a laboratory manual if the instructor so desires.

Summaries, Thought Questions, and Problems: Does each chapter, or better, does each learning unit contain a summary and a carefully graded series of thought questions? Do the sections that involve mathematics contain a set of graded numerical problems of a practical nature that are closely related to the actual subject matter?

Desirable Features: Does the text include a preface *to be read by the student;* a short section on *How to Study the Text;* and an interest-getting first chapter that presents a bird's-eye view of the entire subject in nontechnical language?

Does the text place special emphasis on important topics and drive them home with the skillful use of bond-formation, review, and drill?

Has the author divided his subject into a series of carefully graded learning units? Are these learning units delicately adjusted in length of study-time to the interest-fatigue span of the adolescent mind? Is the study-time of these units specified?

Does the text make ample allowance for individual differences by the careful and not too frequent use of properly graded new-type tests, thought questions, and problems; and by suggestions regarding outside reading and investigation?

Are the stumblingblock or sticker concepts given special treatment with the use of the multiple-angle attack and bond-formation methods?

Are mathematical applications treated by the indirect method? In other words are fundamental concepts thoroughly explained before any attempt is made to apply the formula and other mathematical devices to their application? The direct method may at first thought appear to produce faster learning speed but it *does not produce sound learning.*

Are the selection and arrangement of subject matter and the method of presentation organic parts of a basic

plan of organization that utilizes to the fullest extent the fundamental principles of progression and of cycling?

Last but not least is the text intrinsically interesting because of the *finesse* with which the author has woven his pattern? Has he limited his content to basically vital and vocationally useful topics? Has he presented this content with the use of methods that are psychologically sound and efficiently productive of true learning habits? Will the text prove its *utility* as a *learning tool* in the hands of a student?

The reader of this article may wonder why the last two questions are put at the end of the list. They are placed there for emphasis. They should be at the head of the essential-features list, but they are not commonly found in existing vocational textbooks. It is sincerely to be hoped, that the day may soon arrive when selectors of vocational textbooks will be hard pressed to pick and choose from the many scientifically written books that *must be produced* if vocational edution expects to keep pace with the march of modern education.

Occupational Rehabilitation of Unemployed Men in a Small City

*John T. Shuman**

CONSERVATIVE estimates place the present number of the unemployed in this country at approximately seven to ten millions of people. Even though the causes for the present situation are many and varied, there seems to be good reason to believe that in the future there will be a certain amount of permanent unemployment, and that workers will be idle for relatively long periods. Although rather definite indications of the present situation began to manifest themselves as early as 1928, industry concerned itself very little with the unemployed man, and education, for the most part, has assumed an attitude of *laissez faire*. However, education today must address and adapt itself to the problems inherent in social and economic change. Since institutions are slow to change, there is certain to be an educational lag which must be reduced as much as possible by studying the current social and economic changes, by ascertaining trends and transitions, and then after determining the implications by adjusting education to them. But, to be more specific, what has education to do with the present economic and even social situation as it affects adults?

*Director of Vocational Education, Williamsport, Pennsylvania.

Unemployment presents problems in adult education because it affects workers already trained in some branch of business or industry; practically all of them mature men and women of all ages. Somewhere in the very midst of their daily lives they must stop and make a new vocational beginning. Most of them present problems in advisement or guidance, upgrading, and retraining after secondary-school age, and as educators we must face the situation far more seriously than we have.

If the problem is once adequately defined and determined, and if the present and future attempts at such rehabilitation on the part of the schools are intelligently and carefully administered, the vocational readjustment of the worker can easily become one of the normal and integral functions of efficiently organized vocational education, and the present educational machinery can be of material use in a part solution of the problems.

However, because of an increasing demand for lower school costs, there is a question as to the wisdom of adding activities that might be considered "borderline" responsibilities of the public schools. Consequently, any educational program devised to assist the un-

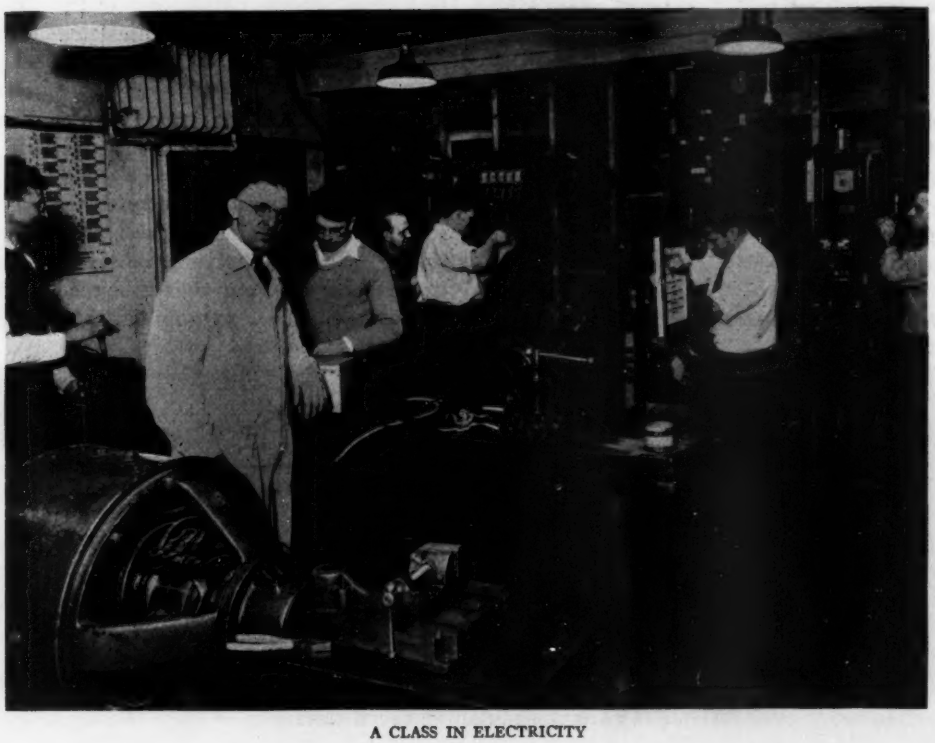
A CLASS OF UNEMPLOYED TRUCK DRIVERS

employed worker should be permitted a natural development and should be considered to a great extent, at least, as simply an expansion or extension of the regular evening- or day-school activities. This, in turn, will tend to keep the cost of instruction so low, that the returns to the community through the return of a reasonable number of these men to a regular payroll will more than compensate for all expenditures.

A MACHINIST IN THE MAKING

In many places, such as New York, Rochester, Pittsburgh, Denver, Atlantic City, Minneapolis, Saginaw, Williamsport, and others, splendid programs utilizing the available facilities of the schools are now in operation. These programs embody the use of the continuation schools, the expansion and extension of the regular evening-school program, the admittance of adults into the day-school shops when not in use, the admittance of high-school graduates as postgraduate students, and many other forms of effective and admirable assistance.

It is imperative, however, that it be understood that organized vocational education cannot offer a panacea, can never solve the problem of unemployment or create nonexistent jobs, but it can and should make continuously available to all adults a working knowledge of the more important phases of business and industry as carried on in local communities and then assist the adult in his vocational and even social readjustment. Nor should we be disappointed if such rehabilitation work as is attempted does not reach as large a group as anticipated. True, the opportunity should be available to all, but experience has shown that probably only 5 to 10 per cent of the total number of unemployed will be attracted to such a program and will actually remain long enough to secure any substantial benefit. However, it is certainly possible in a well-organized situation to attract a larger percentage of un-



A CLASS IN ELECTRICITY

employed workers and to keep them in attendance in the classes.

Before proceeding further, we should define carefully a term that has been used rather generally and carelessly in reference to educational work with unemployed men. Retraining, which refers to only one phase of a sound rehabilitation program, refers in a broad way to the training of men for an occupation other than that in which they have been employed. However, by far the greatest amount of rehabilitation work is trade extension or trade preparatory in nature and a rather small percentage of the total is actual retraining. For a few individuals retraining is necessary, but a program consisting largely of a retraining procedure could be considered only as both wasteful and containing little of benefit for the future of vocational education.

Any well-organized program of vocational rehabilitation consists essentially of three steps: Diagnosis of the individual's case and vocational advisement, occupational training, placement and follow-up after placement.

The diagnosis of the unemployed worker's case is made by means of personal interviews, by an investigation of any available and accessible work records of the individual, and by observation and contact with the individual in the class. From these various sources a considerable amount of reliable data which are very essential to guiding, advising, and handling the unemployed worker is collected with a minimum of clerical assistance.

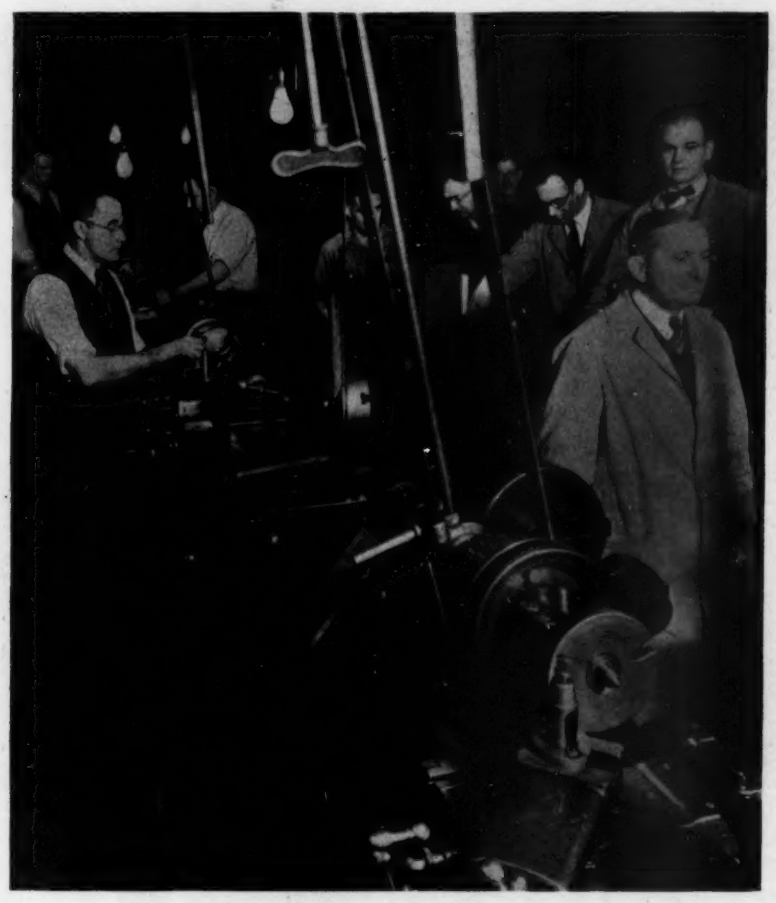
It is worth noting at this point that many workers coming to the school for assistance are given only vocational advisement and are not urged to attend the classes. The reason and logic back of this is readily apparent, but care in one respect is vital here. Vocational advisement given these adult citizens must not be the kind of advisement so frequently given our immature high-school students; it must be specific, concrete, and applicable to the situation in the local community. If at all possible, it must be something on which the adult can act, and consequently, it is not enough to know merely the trend of an industry; it is necessary to have available such knowledge as the operating conditions of local plants, the supply and demand of workers for definite existing payroll jobs, the possible future conditions of local plants, the type of men required, and the possible production schedules.

LEVELING UP

The assignment of the worker to a definite class group follows the preliminary personal interviews and diagnosis if it is felt that an educational procedure will help the individual. The classes are held as regular evening-school classes, although an occasional one meets late in the afternoon or on Saturday morning. There are different problems, of course, but the educational procedure used in handling the men conforms closely to the accepted methods and technique of adult education.

In all of this educational work, skill and knowledge must be carefully integrated and directed toward an ultimate goal. To this end, the instructors direct their work along two lines; namely, education in a particular field of industry and the correction or improvement of personal shortcomings or failure characteristics that are far too often present in men who are continuously unemployed. This latter phase of the work is actually personal and vocational guidance given by the instructor as an integral part of his class activities. In order to accomplish this, fifteen-minute discussion periods, which are in charge of the instructor, are held before the beginning of the regular classwork. During the discussion period such questions are discussed as, Why was I laid off instead of someone else? What questions might I be asked when looking for a job and how can I best answer them?, What is the best way to seek work?, and so on, *ad infinitum*. After the preliminary discussion period, the regular vocational or job training work of the class begins, and it is during this second part of the class that the general discussions are frequently continued more specifically between the instructor and the student. Such results are possible and logical because every discussion is based on an actual local incident, although, of course, the true identity of the individuals concerned is not revealed. The next step in the procedure naturally is that of placing the unemployed person on a job if at all possible.

It is perfectly obvious that an unemployed man needs a job more than anything else, regardless of the cause of his unemployment. Thus, the employment agency — but not the usual type of employment agency — must come into the picture. The employment agency coöperating with a public school of unemployment rehabilitation must have the confidence of local employers, must be used by them, and actually must know the capabilities and the characteristics of the men recommended for jobs. Frequently, it has proved desirable to give some of the unemployed men trade tests in the school shops before sending them out to apply for specific jobs.



A CLASS OF UNEMPLOYED MEN IN THE MACHINE SHOP

In our particular organization a full-time coördinator, who maintains a close contact with the industries of the community and with the other employment bureaus of the city, is in charge of this work. It is the duty of this man to coördinate, as far as it is possible and advisable, the unemployment activities of the school district and of the various coöperating organizations, to place the unemployed evening-school stu-

dents on jobs wherever possible, and then to maintain an adequate follow-up on these men in order to assist them in their occupational readjustment.

Aside from the employment service, an important part of the coördinator's work consists of helping the unemployed individual to remove or overcome unfavorable personnel records by clearing up long-standing misunderstandings, by acting as an intermediary between the workman and his former employer.

This human laboratory was started in the winter of 1931 by the Williamsport School District in coöperation with the local chamber of commerce. Sixty-eight men enrolled in those original classes. From October, 1931, to June, 1932, approximately a thousand men and women have come into the school seeking assistance and vocational advisement, and of that number slightly over five hundred have enrolled in the evening-school classes studying a wide variety of subjects from English to machine-shop practice or truck driving. Probably the most effective occupational rehabilitation work with the unemployed worker has been done in special courses conducted in coöperation with individual companies. About one third of the students who have remained in the classes a reasonable length of time have been placed on regular payroll jobs. Most of those over 21 have taken work related to their former occupations or jobs, and the younger students have taken trade-preparatory work.

Although the basic reason for conducting the work is to assist the unemployed worker by increasing his skill in some occupation, the administrators and instructors seek constantly through the class discussions and conferences to develop those traits which are equally necessary for holding a job: a reward for the rights of the employer; a regard for the rights of fellow employees; the ability and desire to coöperate; the restoration or creation of self-confidence; and the right attitude toward the job and toward society. Thus, the Public School for Unemployment Rehabilitation conducted as an integral unit of the evening vocational school is rendering distinctive and invaluable services to the community; first, in upgrading those who are temporarily unemployed but who will be recalled by their employers at the first opportunity; second, by giving to the idle youth of 16 to 21 fundamental preparation for some vocation; third, by sustaining to a rather remarkable degree the morale of those unemployed who attend the classes; fourth, by giving those who are physically handicapped or who are unemployed because of technological changes an opportunity to make a new vocational beginning; and fifth, by contributing in a most effective way to the economic, social, moral, intellectual, and occupational rehabilitation of a large number of unemployed workers who have proved themselves stable citizens and whose future well-being is the deep concern of the community.

New Things from Old

*J. I. Sowers**

*Director of Industrial Education, Miami, Florida.

A FRIEND of mine while admiring a William and Mary type highboy in my guest room some time ago, remarked that it must be a rare old piece of great value. "Quite to the contrary," I remarked, "It is an old walnut washstand made over." And it was just that.

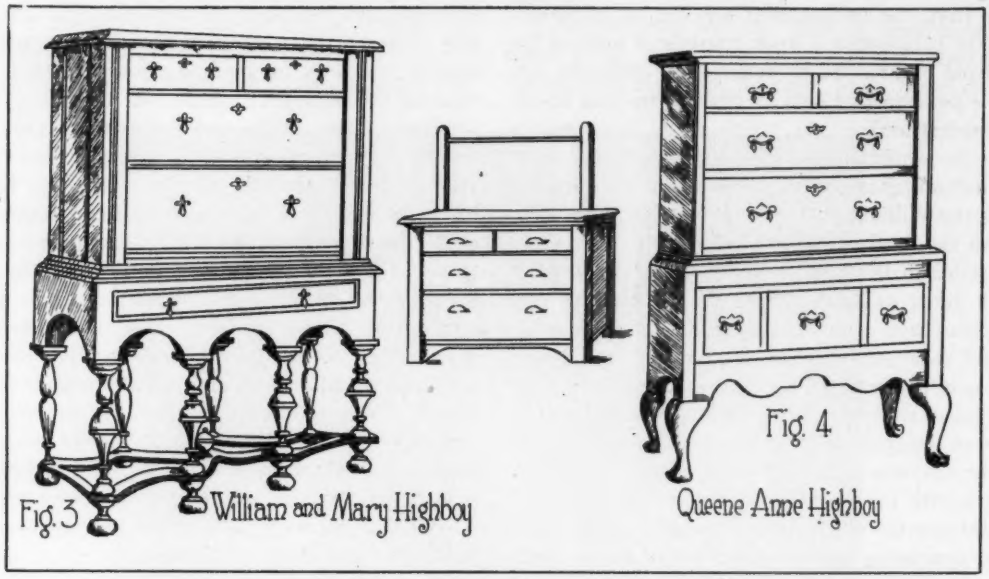
Conservation is always an interesting subject. The creation of entirely new-appearing models of furniture from old discarded pieces, perhaps long since relegated to the attic, often appears to the uninitiated, as the practice of legerdemain, so entirely different do some of the new pieces appear. Some of this work requires not only skill in craftsmanship, but a knowledge of designing as well.

The examples of the reconstruction and redesigning of new pieces of furniture from old ones shown herewith, will give some idea of the scope and nature of this work. Some helpful suggestions that are easily carried out are given, as well as others that require a rather high degree of skill to accomplish. The illustrations presented will readily suggest other adaptations that can be made from the objects presented, and they will also suggest other subjects for remodeling not touched on in the limits of this article.

This practice of making new things from old ones can readily get to be quite an interesting hobby for the amateur craftsman.

The first object, Figure 1, is that of a barrel, the staves of which were reversed and used as legs for a

taboret. Of course, in this work an oak barrel was used. Footstools, coffee tables, and a variety of other small but convenient household utilities may also be made. The staves may be used with little material change as shown, or they may be modeled and shaped, pierced and jig-sawed, or carved. The oak used for staves is usually of the highest quality, and due to age and use, often finely colored.



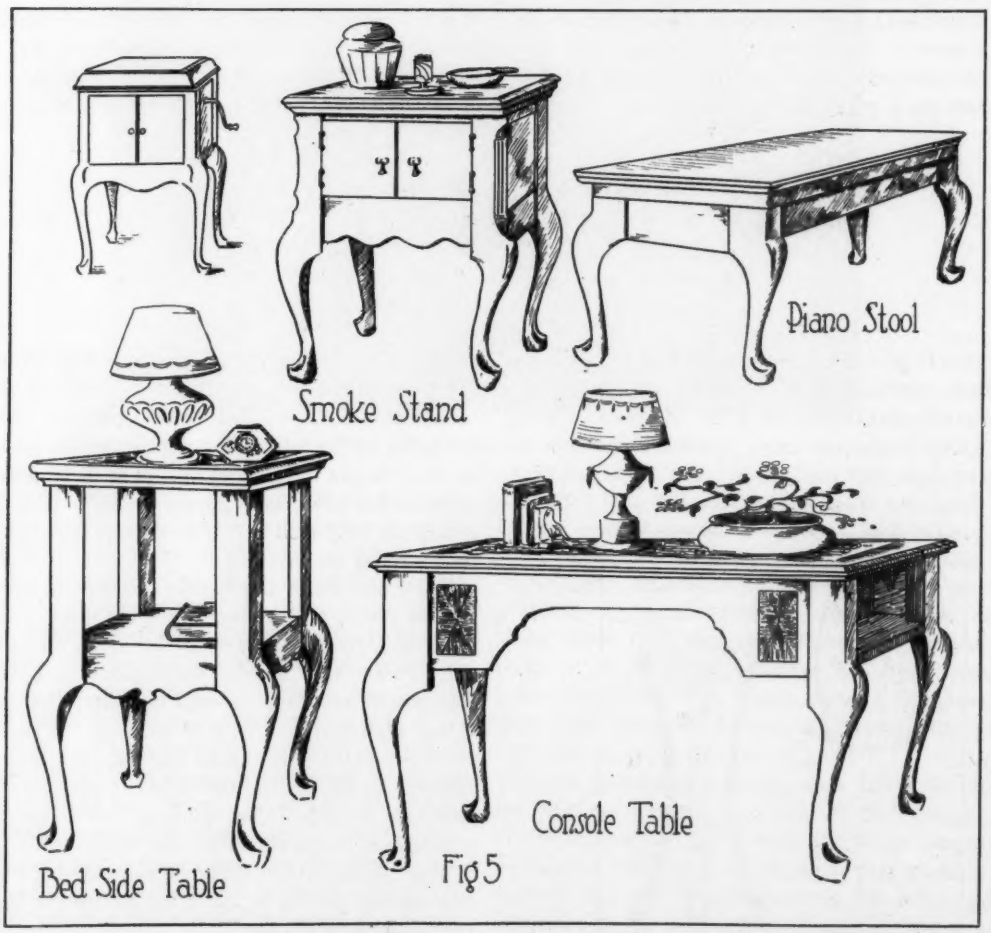


Figure 2 needs no explanation. Practically, any old chair of the style shown, perhaps discarded and broken, can be salvaged and made into a handsome and convenient bedroom rocker. The addition of upholstering in design and coloring to match the room in which it is to be used, adds greatly to comfort and appearance. About all that was done to this chair was to cut down the legs and add the rockers.

Figure 3 takes one into a little more difficult field of work. One which requires some knowledge of design. There are many old washstands left over from the Rutherford B. Hayes period of American life. These have practically all been cast into the discard by the modern bathroom. Some of these are of cheap woods, cheaply made, and not worth resurrecting. Others are made of walnut, mahogany, or other fine cabinet woods and are worthy of our best efforts at restoration.

The opening paragraph of this article indicated the use that was made of one fine old walnut washstand. This was made into a William and Mary highboy very much like the drawing shown here. Figure 4 shows a Queen Anne highboy, made from the same type of washstand. This latter is perhaps somewhat less difficult to make. In choosing a period style for the reconstruction of some pieces of this kind, the amateur craftsman will, of course, choose a period design to fit his present furnishings. Books of measured designs of period furniture will be very useful and a decided help in working out pieces of this kind.[1]

Figure 5 illustrates the possibilities that lie in the now no longer used, and out-moded phonograph. Of course, again, the cabinet used must be well and honestly made. In the heyday of the phonograph many of these cabinets were well-designed works of art, and made of splendid woods. Most of these are now gathering dust in storage, having been discarded for the radio. The rebuilding of these cabinets into modern pieces of furniture offers a fertile field for the imagination, invention, and mechanical skill. The cabinet shown here is of the Queen Anne type with cabriole legs; of course, there were many other types of cabinets. It will be possible to find them done in Adam, Sheraton, Heppelwhite, Chippendale, and other period styles. Naturally, whatever is made out of them must follow and keep strictly to the original period style, if they are to be creditable pieces of work. Again, books on craftsman designs covering these periods will be necessary. Two of the articles shown here, the smoking stand and the bedside table, are made with very little change in the original and with little added material.

There has been more added material used in the console table. Yet even in this large fine piece one will be surprised to learn how far the original material goes, and how little the added stock costs.

The reconstruction of new things from old ones affords interesting and profitable occupation for one's leisure. Practically all of the better pieces that have been discarded can be rebuilt into new and beautiful things if one exercises care and good planning.

In using old woods, and in rebuilding new pieces from old ones, it is often necessary to fill in screw holes, build up damaged parts, and sometimes build on small moldings, etc., to match something already present in the original. For this use there are several different kinds of liquid- or plastic-wood products on the market which can be used. When skillfully applied and carefully stained to match the original, it is practically impossible to discover this added material.

In the school shops of Miami, Florida, during the past two years, much of this kind of reconstruction work was undertaken. With all school funds at a very low ebb, and few students able to purchase special lumber in sufficient quantities to make up large pieces, the making of new things from old ones fits into certain phases of advanced school shopwork to good advantage. The ideas given in this article may help others to develop work for their school shops.

[1] *Measured Drawings of Early American Furniture*, and *Reproductions of Antique Furniture*, both published by the Bruce Publishing Company, Milwaukee, Wis.

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THE SONG OF THE SAW

W. M. Phares, High School, Fort Dodge, Iowa

I love to hear the song of the saw,
As it sings at its work and mine;
When the wood runs true, as 'tis wont to do,
The tone is smooth and fine.

BUT

The saw tunes change when a snarl comes in
The wood that it's biting through,
And the discords sound as a knot is found —
In spite of all I can do,

AND

The wood that it cuts loses part of itself,
The same as you and I;
When the Master builder shapes our lives
A part of us must die.

SO

The wood of life with its fiber fine
We'll crosscut and rip with a song;
If we fit the saw and the wood runs true —
We'll sing life's journey long.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. METZ, Editor

PROFITING FROM EXPERIENCE

Vacation time over, the instructor who has attended school during the summer goes through the metamorphosis of turning from student to teacher. The time which he spent at one of the many colleges during his vacation period no doubt has done him a great amount of good. Besides, and over and above the credits which were earned, there is the information gathered, the broader outlook gained, the new method acquired, the original foundation improved.

There are, however, other factors to be considered. For instance: What was that intangible something that made one summer course more enjoyable, more valuable than another? Why did this one professor impress his students more than the others? No doubt, all of them knew their subject well, yet the one seemed to do his job of teaching better than the others. Why? Will a careful analysis of this professor's methods result in anything that the teacher can apply with his own students?

Then there may have been one of the professors, who, in spite of knowing his subject, could not make his work interesting. Why was that? Cannot his methods be studied, and those negative, detrimental factors segregated so that they may be avoided in one's own work?

Frequently the matter studied in summer school is of such nature that it cannot be directly applied in the shop class. But the teacher who has so lately been a student can readily place himself in the position of his own students and in that way learn to apply methods from which profit was obtained during the summer months, and to avoid those things which had a tendency to keep the student from obtaining the greatest amount of good for the time spent in class.

This placing oneself in the other man's shoes is a mighty good thing to do, anyway, but it is especially to be recommended to the teacher, because by so doing he will develop the sympathy which students, especially those of the adolescent period, appreciate and need.

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MAKING BOTH ENDS MEET

During the present period, more than at any other time, industrial-arts teachers must do their utmost to keep down expenses. The problem of how this may be accomplished is not an easy one, and it will tax the ingenuity of the very best to successfully accomplish it. For that reason an article such as "New Things from Old," by J. I. Sowers, in this issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is very timely.

There may be some who will say "Remodeling old furniture for new uses has been done frequently before this." What they say is true, and yet there are few teachers who have consciously gone into this with the view of circumventing the lack of materials made necessary by the drastic retrenchments forced upon the school by present economic conditions. The objection also may be made that only a few in each class could undertake such work, while the majority of the students would not be able to furnish any old material that might be remodeled. This also is true. Nevertheless, if there are only a few of these jobs undertaken in each class, the savings thus effected are worth while — but much more valuable is the experience of working over old, probably discarded materials, and producing with them something that can actually be used, and something which after the work is done, is really a new article, which besides utility may even possess beauty.

While Mr. Sowers' article is specifically written for the teacher of woodwork, nevertheless its principle can be applied in other school shops as well. It will take ingenuity, however, to figure out how this can be done. It is a challenge — but industrial-arts men are used to being challenged, and no doubt, they will be able to successfully cope with this new problem, just as they have solved others with which they were confronted in the past.

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A NECESSARY JOB

The opening of school is a very good time to think about an analysis of the work to be carried on in the school shop if that analysis has not been made before. Unfortunately, too many industrial-arts men are still content to run along without an analysis, yes, even without an outline of instruction.

It is true, much good industrial-arts work was done long before anything was heard about an analysis. But, even in the earlier days, the better teachers of industrial-arts work had a definite outline of instruction, and while they did not make an analysis just like those advocated at the present day, nevertheless they had in mind just what they intended to do with every bit of work they introduced.

However, industrial-arts instruction is no longer in its infancy. Many of the older teachers have left tangible evidence of what their aims were, how they proposed to reach their goals, and just what had to be done to accomplish the desired results. Probably they did not always have their aims as clearly expressed as might have been desired, probably the goals reached were at variance with the aims originally set up, but some of these men were not afraid to commit their views to paper. Neither were they too stubborn to change their methods when they found that their planning did not quite come up to their expectations as

far as results were concerned.

During all of this time, however, there were thousands of teachers, and we still have many with us, who, after teaching for years, cannot produce an outline of their course. Many of these, too, have done, and still are doing good work, but the results that they achieve are due to accident rather than planning.

For those, then, who have not as yet definitely determined just what the projects, which they have chosen, accomplish, it is time right now to begin on the analysis which will disclose just what learning units have been included in the course that is being taught, and also those that have been left out but really should have been included.

Probably the best way to proceed is to base the analysis upon the outlines contained in the booklet issued by the A.V.A. committee on *Standards of Attainment in Industrial-Arts Teaching*. This is obtainable by writing to Mr. C. M. Miller, secretary, American Vocational Association, State Board for Vocational Education, Topeka, Kansas. It is well to remember right from the start, that these standards of attainment are written for the junior-high-school level, not for the high school, nor for the technical high school, nor for Smith-Hughes courses.

The method of attacking the problem is simple. Take the simplest beginning problem and check off on the A.V.A. list the number of learning units which it covers. Do the same thing for the next problem, and the next, until all of those in the course have been covered. Are there any units in the A.V.A. list that have not been touched upon in the course? Are there any in the course that are not in the list? If so, should they be on the list, or should they be taken out of the course. If they are to be left in the course, the A.V.A. committee ought to be notified that their list is incomplete and that it would be improved if the stated unit or units would be added.

By making an analysis in this way, the teacher, first of all, helps himself. He then has something tangible, something definite to follow. He knows where he is going, and also when he gets there.

Second, such an analysis helps the industrial-arts movement throughout the country. Even those academic teachers who can see little good in school-shop work must give credit to the shop teacher who can prepare a good analysis and outline of the work which he is teaching.

Third, in the ratio in which the development of the work of the shop teacher gets to be more scientific, the industrial-arts teachers will get the reputation of being the progressive group which they really are. It may make the A.V.A. see that the industrial-arts section of their organization is important, and accord it a more generous treatment than has been done in the past. This would be a move in the right direction, as the industrial-arts man, at present, is not represented by any national organization.

Lastly, with work properly analyzed and arranged, shopwork can serve better the purpose for which it was introduced into the educational system. After everything is said and done, that is the main thing, and if the student in the school will be better served when this work is done, and there is no question that he will be, every industrial-arts teacher should be interested and willing to undertake that which will help him to do better those things which affect so vitally the product of the school — the student.

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GUIDING VERSUS DRIVING

"Vinegar catches no flies" is an adage which may be paraphrased for the school shop to read "An irascible instructor does not attract students."

The time, when whip in hand, the teacher ruled the students in his charge, is happily over. The school as pictured in Vittorino da Feltre's *Casa Jocosa* ("Pleasant House"), however, has not replaced entirely the old dismal classroom with the teacher who wielded the whip.

There are still many instructors whose idea of discipline is one of stern unfriendliness. Unfortunately for themselves and for their students, they have not yet discovered the fact that they are there to guide and to direct, and not to coerce and to browbeat.

They seem not to be aware that the adolescent student needs to know the reason why he is asked to do a certain thing in a certain way much more so than do younger students. They seem to feel that authority ought to be unquestioned and that the reason why for any order given ought not to be required, and above all, need not be given.

The teacher who knows his subject thoroughly, is friendly and sympathetic, is reasonable, firm, and above all, honest and just, will not only hold the respect but also the regard of his students. A little introspection at the opening of school will help the shop instructor decide into which camp he belongs, whether he is a stern driver or a leader who sets a brisk pace which his followers gladly and willingly adopt as their own.

A good salesman tries to adjust his personality, his method of approach, his manner of speech, everything that he can personally do in order to reduce sales resistance as much as he can even before he approaches his prospect. The earnest instructor must imitate him. He, too, must take stock of himself and reduce as much as he can all those personal elements which might arouse antagonism and which might make it harder for him to take care of his job in an efficient and satisfactory manner.

If the salesman pays so much attention to this subject which is vital to himself alone, how much more then should the teacher whose failure or success does not only affect himself but also the numerous students who attend his classes, and through them an ever-increasing circle of those with whom they come in daily contact.

After the Smoke Clears

*Gerald A. Boate**

THE opening of school, after a long summer vacation spent as fancy dictates, comes as a shock. Jumping into an ice-coated lake also gives a shock. With either, when once the jump is made, the sensation experienced is not half as bad as imagination pictured it. The difficulties to be overcome are surmounted by courage and determination. A simple plan which provides immediate work for the first few days, gives teacher and students an opportunity to become accustomed to the change of conditions.

A general plans his campaign, and then instructs his subordinates to carry out the details. When action begins, the opposition may very much upset the well-laid scheme, and individual combat may have to be resorted to. As individuals we all like to be on the winning side, because we like the laudation and acclamation that goes with victory. To be victorious, an objective must be fixed, reached, and possessed, not only by one unit, but by the entire army. This requires co-ordination, which, as defined by the *Standard Dictionary,* is: "Co-ordinate — To put in the same class, rank, or order, or a harmonious reciprocal relation."

In the high and intermediate schools the student must take various units of study, each of which requires that definite scholastic standards be attained in order that points or credits may be earned. A sufficient accumulation of credits leads to graduation. But what is graduation? It is not a "getting through," but rather a beginning of life as a self-motivated individual who can think logically, live with others agreeably, earn a decent living, act with courage and determination, live up to fixed ideals of achievement, and be determined to do the right thing at all times and at all costs. All of the instructional units "taken" while attending school should be so blended, and the reason why they are in the curriculum should be explained so clearly that they will be co-ordinated. All of them should give a useful, lasting knowledge which later may act as tools for carving out the future. In other words, they should serve a useful purpose in life.

Should such training be correlated or co-ordinated? There is a difference. Correlation is defined by the *Standard Dictionary* thus: "Correlation — To put in relation, especially reciprocal relation."

Co-ordination seems more desirable in that "harmony" is introduced. If our courses can be harmonized, each will gain weight if emphasis is placed upon its own specific purpose, and the student is shown how the knowledge or training acquired may serve in the future.

Frequently the unrest which arises in schools, and which may turn a peaceful group of students into a mob, is caused either by the absence of a real educational plan, or by the failure of the students to understand the plans, orders, or policies of the teachers or of the administrators. As institutions increase in size, the individual pupils lose their identity because the close personal contact between pupil and teacher is lost. The 8B6 group may be known to a teacher as those who passed a high intelligence test, while the same test classified the 8B1 group as a bunch of slow wits. This selective grouping may make teaching a course very much easier, but it certainly does not permit the 8B1 pupil to compare his achievements with those of the 8B6 group in such subjects as English, history, and mathematics. In athletics, gymnasium, music, household science, and manual arts, where numbers are thought to be economy, large mixed groups are encouraged, and frequently there are surprises, when "the thorn is found to bear a rose." It is in these groups where native talent may be discovered, interest kindled, and an ambition awakened which overcomes obstacles that were more imaginary than real. In a subject which appeals, if it is skillfully handled, there is a chance for the pupil, for the first time, to understand "What's it all about." Thus a group of boys who were unruly, lacked interest, and miserably failed under one teacher in arithmetic, quickly came up to par when assigned to another teacher who understood boy psychology, and who knew how to put boy-appeal into arithmetic.

This is no isolated instance. Progressive teachers of special and elective subjects should so upgrade them that they may be co-ordinated with the required subjects and thus made to act as a tonic to the whole system.

The first step in co-ordination is faith that it may bring better pupil development. The second, to prepare a co-ordination chart on paper, of the subjects which are to be brought into harmonious reciprocal relation. The content of these courses should then be minutely analyzed and the findings placed in vertical columns, so that further analysis and change may be noted more easily. If a start is made in the subjects more easily visualized, the work will be easier and more fascinating. At best making the preliminary study for producing such a co-ordination chart is a long hard job, and it should only be undertaken by qualified teachers who have had a variety of experiences. A teacher making such a study should possess a pleasing personality, and be armed with authority to find out how things are being done.

The questions that are to be answered may be stated thus:

1. What is the relation between the work in the

*Seattle, Washington.

metal shop and that in elementary science, English, mathematics, social science?

2. What is the direct, continuous, and useful connection between mechanical drawing and the work given in the various shops?

3. Is there a connection between the work in printing and that given in the metal shop?

4. Can junior business training be applied in shopwork?

5. How may the school library best serve the shops?

6. Is there any manifestation of the effects of music and physical education in shopwork.

7. What should the school shops expect from a boy who has had some training in elementary art.

The following few illustrations may show just how this co-ordination may be worked out.

English and the Metal Shop

Undoubtedly the English which is taught will be of benefit to the pupils who elect shopwork, by considering a few of the shop needs:

1. Definiteness and exactness are necessary. Stress should be placed upon the noun rather than upon the pronoun. A material or a tool should be spoken of by the correct name, and not as "A piece of that stuff," or as a "thing."

2. A new vocabulary of from 200 to 300 words confront a boy who is beginning shopwork. The listing and defining of these shop terms furnishes the boys with some good dictionary work.

3. The ability to read an assignment and to select the important from the unimportant is most essential. Composition papers on operations, processes, and materials offer splendid themes. Copper, coal, iron, steel, aluminum, lead, mica, transite, bakelite, lumber, wood, paint, varnish, etc., are subjects about which much of interest may be spoken or written.

4. The ability to speak before a class, telling in a simple yet forceful way how a project is constructed, is desirable. These are all concrete subjects in which the center of interest is a real object.

5. To know how to analyze a sequence of necessary operations, and how to arrange them correctly is important.

6. Making out an accurate report of a process or a visit to an industry is an extremely worth-while accomplishment.

Mathematics and the Metal Shop

All work of a mechanical or technical nature requires an understanding of mathematics. So necessary is a knowledge of this subject that evening schools are provided to give an opportunity which will open the doors of progress to those industrial workers whose lack of knowledge in this subject handicaps them.

In the junior high school, mathematics is of the greatest importance. Here simple arithmetic must be made concrete. To advance in the shops, a boy must be able to:

1. Read a scale or rule accurately.

2. Add and subtract such common fractions as 64ths, 32nds, 16ths, and 8ths.

3. He must be able to accurately weigh and calculate the prices of materials when the price is given by the pound, square foot, or board foot.

4. He must be able to add and subtract angles and construct regular polygons.

5. He must be able to change fractions into decimals, and decimals into fractions, quickly and accurately.

6. He should be able to figure cubic contents of rectangular and cylindrical containers in cubic inches, pints, and gallons.

7. He should be able to figure out a tap-drill size.

8. Calculate the ratios of gear teeth and pulleys from diameters and velocities.

9. Be able to figure out the offset for a taper.

10. Be able to solve a simple equation, such as Ohm's law for electrical circuits.

11. Be able to figure the area of a circle from the diameter.

12. Calculate wire needed for an induction coil or transformer.

Elementary Science and Metal Shop

The whole fabric of successful manipulation of metals is dependent upon the exact knowledge and skill which may come only through an understanding of the principles of elementary science.

Some consideration of each of the following will be helpful:

1. The chemistry of a flame. The varying temperatures in an open flame. Oxidizing and deoxidization. Effect of an open flame upon the purity of air. How carbon monoxide is produced. How carbon dioxide affects plants, animals, and persons.

2. Why sheet copper, when placed in a flame, assumes the beautiful colors of the rainbow? Why hammering copper makes it hard and brittle? How hard copper can be softened? What is the difference between iron and steel? How may steel be hardened?

3. Do the colors that succeed one another in a piece of steel being heated act as a gauge, or measure of the temperature? At what temperature does steel melt? Which is hotter, a straw- or a blue-colored flame.

4. Where does sal ammoniac come from? What does it do to copper? Is solder mined? Does rosin grow? What makes floor wax hard? In weakening nitric acid with water, which should be added last? Why?

5. What is a mechanical advantage? How many types of levers are used? What is the difference between a blow and a pull? Why is the handle of a baseball bat tapered? What is rust? What is oxidization? What is horse power? What is the difference between power, energy, and work? Has excess air any effect upon steel being heated? Of what is a grinding wheel made? Why does a tool being ground get hot? Does steel wool come from Australia.

6. What is an Ohm, a Watt, a Volt, a foot-pound? How is work measured? How many volts in a lightning flash? How many volts will kill a man? Where does electricity come from? Has forest growth anything to do with pure drinking water? Why? At what point will shears cut best? Why?

7. Can you magnetize a screw driver? What is a dry battery, and is it dry? What is inside an electric flatiron? What is an induction coil? Does electricity flow through wires as water flows through a pipe? Why is copper used for electric wires?

Social Science and the Metal Shop

A metal shop, in a limited way, may be run on the *functional foremanship plan*. All tasks which are necessary for a quick start at the ringing of the bell, at opening and closing time, may be assigned to boys. The student may be made responsible for cleanliness, order, keeping daily records, and maintaining correct working conditions. The divisions of labor are related and fall under the following classification:

1. *Timekeeper* — Calls roll, makes out absence slips for O.K., and finds out why and who leaves or enters the shop.

2. *Toolkeeper* — Issues and collects all small tools, and is responsible for the condition of the toolroom. The toolroom should never be used for impounding purposes.

3. *Roomkeeper* — May be assigned four assistants, each being responsible for the condition of an assigned area. All should coöperate with both time- and toolkeepers.

These responsibilities may be rotated every two weeks. The recording of supplies received and issued, involves money, and therefore must be a teacher responsibility.

Every boy should be responsible for his own time and craft

record. The cards should be filed alphabetically and always accessible to the pupils, except for a five-day period at the close of each quarter, when records should be carefully studied by the instructor.

Elimination of waste should be strongly stressed and the habit of utilizing, when possible, discarded material should receive a bonus. Ingenuity and good workmanship should always be strongly commended. A word of praise means much and costs little. Two simple words, "good work," often makes a full day's happiness.

To have cleanliness and self-government become a habit, may be of as much importance as a lesson learned from the text. If the word *happiness* is made a shop slogan, all who understand will live and work to make the word appropriate. The real joy in life comes from being happy while working.

How may the social-science and history department assist? By placing emphasis on self-government. Clearing the mind for logical individual thinking. By forming a habit of referring to the biography of Americans who have added to America's prestige. To build up this habit, reading The Life of Edison, (illumination); Bell, (telephone); Morse, (telegraph); Stevenson, (steam engine); Fulton, (steam boat); Shelton, (automobiles); Wright Brothers, (airplanes); Thompson, (electric transformers); Westinghouse, (air brake); Dr. Goodrich, (pneumatic tires); Hill, (railroad builder); DeForest, (radio); Eastman, (practical photography); Pathé, (motion pictures); Burbank, (new plants); Howe, (sewing machines); and others may be set up as a requirement.

The social-science department is linked up with life. To it the boys look for the answer of "What shall I be?" The answer is found by personally exploring many things. From the mass of accumulated impressions a suitable course to pursue must be evolved. This guidance problem entails great responsibilities. To be a successful counselor, one must view life from many angles.

Those who administer and conduct the schools of America, are in the most responsible job which the nation has to offer. There is ever a danger in large-scale organization that system will replace individual understanding. Co-ordination is for better understanding of all who come under its influence, if the objective, to keep things working harmoniously, is never lost sight of.

An Assembly Program for Printers

*L. A. Rabe**

DURING the school term of 1932 the industrial-arts teachers of a school in Cincinnati were asked to prepare a program for the junior-high-school pupils to be given in the auditorium of the school. The printing department was allotted fifteen minutes of the time. After searching in the various libraries and writing to a number of firms who might be expected to have something suitable for this type of program, the instructor found that it was necessary to find and prepare the material. The children of the eighth and ninth grades became interested and each one contributed his share to the program which, when rendered, was both interesting and instructive.

The subject selected was "The Evolution of the Book" and the plan used was as follows:

A classroom scene was presented and about twelve boys selected to act as pupils. One of the taller boys was the instructor. Printing equipment on the back of the stage and a few boys setting type lent color to the scene.

The young instructor announced the subject for the day was the "Evolution of the Book" and that a number of the pupils had been asked to demonstrate the various steps leading up to the invention of printing. He then proceeded to give a brief history of the means of communication beginning with the "Cairn," the stone carving of the Egyptians, the clay tablet, the first alphabet, and so on, ending with the scroll and the invention of movable type.

As each new method was announced, a boy at the left of the stage placed a large placard with the words, "Cairn," "Stone Carving," or, whatever the subject might be (the placards were printed by boys in the class), on an easel. One of the members of the class would ask a question leading to further information. The instructor would then call a boy to demonstrate. The successive questions and answers gradually led to the invention of movable type by Gutenberg. For this purpose four letters, t, y, p, and e, were used. These letters were made of wood about twenty inches high and nine inches wide. A boy in the class was asked to explain about type being cast in reverse and read from left to right. This led to the question, "Do you think printing is a good trade to follow?" The young instructor answered this with information about the opportunities in the various branches of the printing industry, and allied trades, the number of printers employed in the United States, the salaries, and chances for advancement.

That the program was a success was evidenced by the interest displayed by the children.

*Western Hills High School, Cincinnati, Ohio.

—◎—

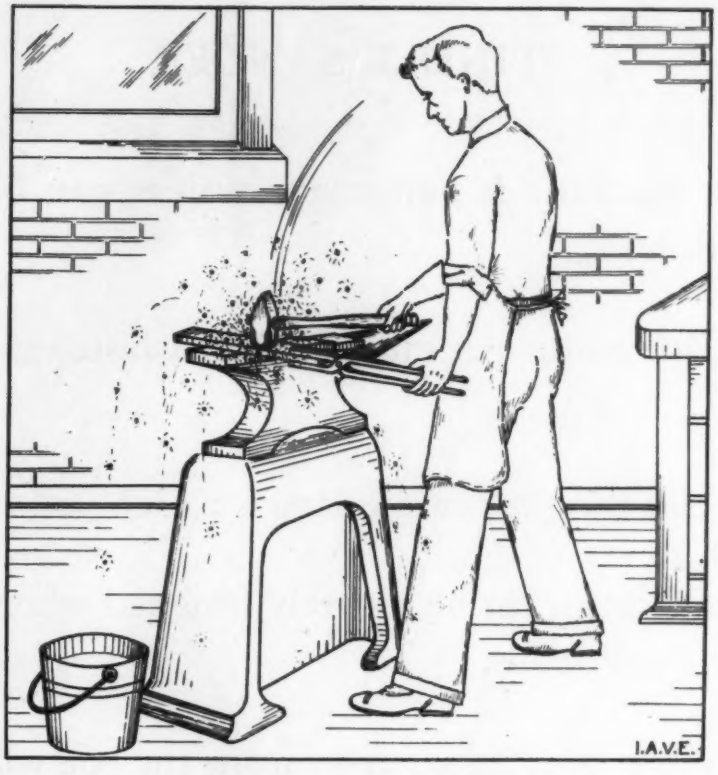
TRADE-EXTENSION EDUCATION

The most effective vocational-education work today is being done with pupils over 16 years of age. The best form of vocational education is the trade-extension type, which takes people already employed in a trade and carries them forward. People who make up their minds as to what they want to do are most easily trained. — *F. T. Struck.*

THE VALUE OF EDUCATION

No matter what the vocation, an education is valuable. Bigger and better opportunities present themselves to the man with an education. Efficiency comes as a result of education. — *S. P. Eisenhour.*

BEWARE OF SPARKS



Sparks may lodge on your shoes and burn your foot.

They also may fall into the cuff of your trousers, or into one of your pockets and set fire to your clothing.

Sparks also may fall among shavings or into the rubbish, and cause a serious fire.

Watch the sparks.

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Submitted by Jos. J. Lukowitz, Milwaukee, Wis.

SAFETY INSTRUCTIONS

SPINDLE SANDER

This machine is dangerous unless you observe the following:

1. The sandpaper must be tightly fastened to the rolls.
2. Use the proper size ring for each roll.
3. Collars must be securely fastened when using split rolls.
4. Keep your hands away from the roll when the machine is running.
5. Stay away from this machine unless you have work to do on it that can be safely done.

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Submitted by Lyle M. Garnett, Milwaukee, Wis.

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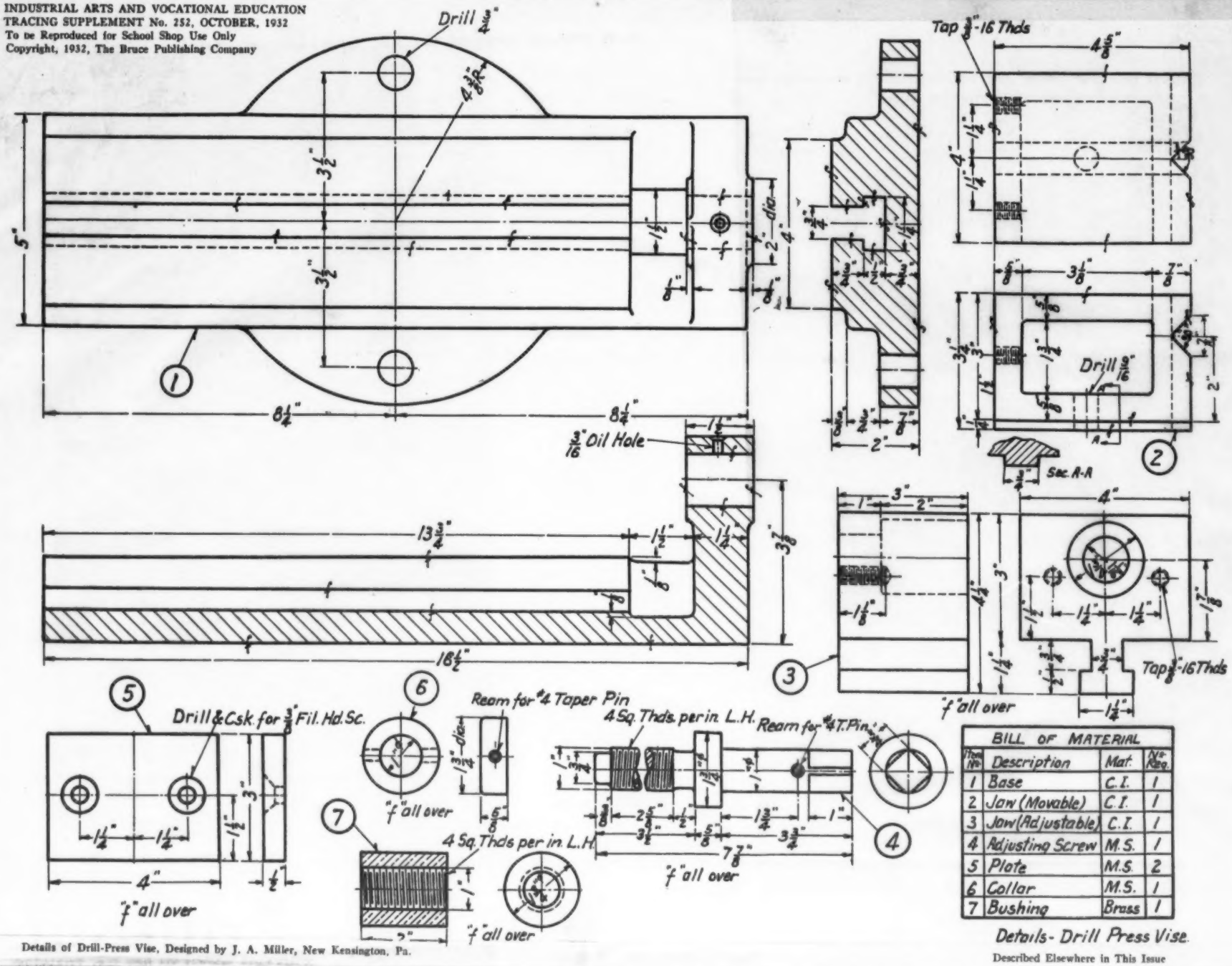

BILL OF MATERIAL			
No.	Description	Mat.	No. Req.
1	Base	C.I.	1
2	Jaw (Movable)	C.I.	1
3	Jaw (Adjustable)	C.I.	1
4	Adjusting Screw	M.S.	1
5	Plate	M.S.	2
6	Collar	M.S.	1
7	Bushing	Brass	1

Details - Drill Press Vise.

Described Elsewhere in This Issue

Details of Drill-Press Vise, Designed by J. A. Miller, New Kensington, Pa.

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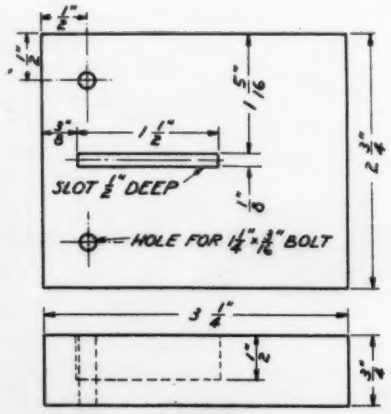
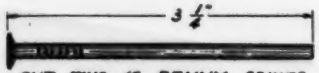
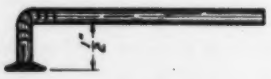


STEP 1

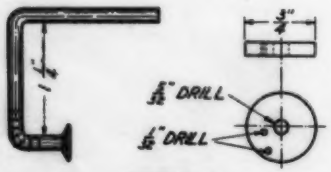


CUT TWO 16 PENNY SPIKES TO GIVEN LENGTH

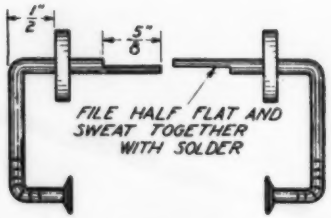
STEP 2



STEP 3



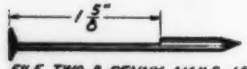
STEP 4



STEP 5

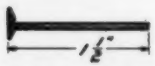
WIND 6 LAYERS OF NO. 24 COPPER WIRE.

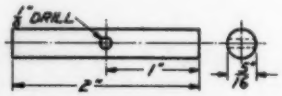
STEP 6

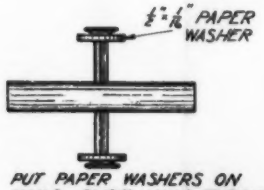


FILE TWO 6 PENNY NAILS AS SHOWN

STEP 7

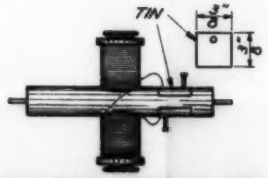


STEP 8

STEP 9



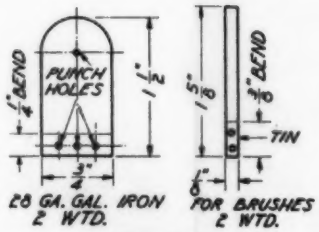
PUT PAPER WASHERS ON NAILS. SLIDE NAILS THROUGH HOLE AND BALANCE THEM. INSULATE THE NAILS WITH PAPER AND THEN SHELLAC.

STEP 10

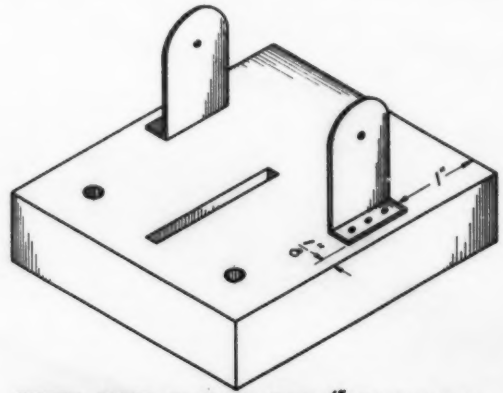


WIND FOUR LAYERS OF WIRE IN THE SAME DIRECTION. FASTEN COMMUTATORS WITH ¼" BRADS. FOR AXLE, DRIVE ½ INCH BRADS INTO ENDS OF 6 THEN CUT OFF HEADS.

STEP 11

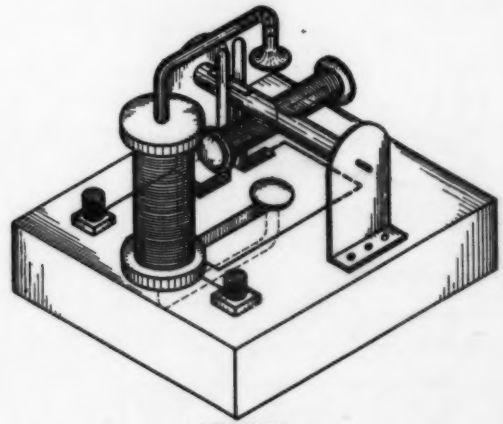


STEP 12



FASTEN PARTS IN PLACE WITH ½" BRADS. SLIP IN ARMATURE. PLACE BRUSHES DIRECTLY BELOW COMMUTATORS. PUT FIELD IN PLACE. CONNECT IN SERIES.

STEP 13



ASSEMBLY

SIMPLE ELECTRIC (NAIL) MOTOR

I.A.V.E.

Submitted by C. E. Beck, Lockport, N. Y.

PROBLEMS & PROJECTS

DRILL-PRESS VISE

J. A. Miller, Director of Vocational Education,
New Kensington, Pennsylvania

(See Supplement No. 252)

The drill-press vise described herewith offers an excellent opportunity for the machine-shop instructor to "get across" to the students many operations which ordinarily are not found on one job.

It is an interesting project throughout, not too difficult and yet it embodies many of the mathematical problems which are embodied in the related work. Besides all this, it is a valuable piece of shop equipment when completed.

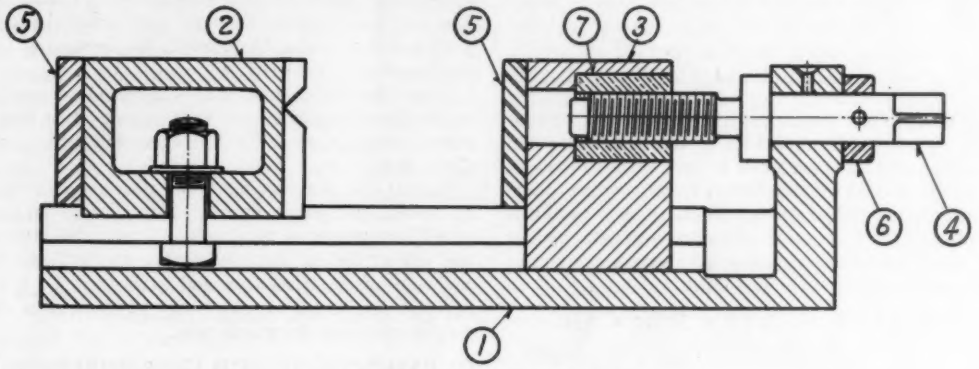
The base is made of cast iron and is fastened to the drill-press table by means of two ¾-in. bolts. It has a T slot cut in for the sliding jaw.

The sliding jaw is made of cast iron and is drilled out to fit the outside diameter of a brass or bronze bushing. This bushing, in turn, is threaded to form the nut for the adjusting screw, by means of which the movable jaw can be brought forward or backward.

The adjustable jaw which is fastened in the T slot with a T bolt has both a horizontal and vertical 90-deg. angle cut in its face so that cylindrical pieces may be easily drilled.

On the opposite end of both jaws a steel plate is screwed, making it possible to turn the jaws around for ordinary drilling.

The vise is a timesaver, requires little work in setting up and can be used on a great variety of jobs.



ASSEMBLY OF DRILL-PRESS VISE

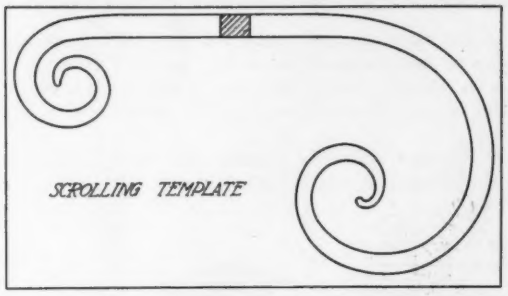
A WROUGHT-IRON GATE

H. M. Andersen, Cicero, Illinois

The gates shown in this picture are 60 in. over all in length and 23 in. high. They weigh 34 lb. The main frame is made of ¾-in. T iron. The strip running lengthwise 4 in. from the top is made of two pieces of T iron welded together and then the rib on each side machined down so that the width is near that of the other T iron. The diagonal members are made of ⅜-in. round width a half-lap joint cut at the center and welded. The arrowheads are cut from 3/16-in. material and welded. The other cross members are made of 3/16 by ½-in. and welded to the frame as well as at the center. All of the scrolls are made of ⅛ by ½-in. material. They are forged to a taper and scrolled over a template with the ⅛-in. edge worked against the template. This is not very difficult to do if the

WROUGHT-IRON SANCTUARY GATE

proper heat is maintained. The template is made of ½ by 5/8-in. material, forged to a taper and scrolled at the anvil and with the aid of tongs. The shields are made of 20-gauge sheet steel. The plates for the hinges are 2½ in. wide and ⅛ in. thick, on which are mounted, lengthwise, in the center, a strip ⅜ in. square. This is to allow the gates to swing through



an arc of 180 deg. The swinging point of the hinge is made of ⅛-in. pipe, two pieces being welded to the hinge plate and one piece to the gate frame. A small U piece welded to one of the gates and projecting over the other, forms a simple catch. The entire surface is rubbed down with emery cloth until it is well cleaned up. Then it is heated with a torch so that the heat of the metal will melt the preparation of beeswax, turpentine, and varnish with which it is rubbed down.

HOT-WATER HEATER FOR CAR

I. H. McVey, Junior-Senior High School, Atchison, Kansas

Operations Involved:

1. Sawing out a section of an old Ford radiator.
2. Soldering all seams.
3. Developing tin case (28 gauge).
4. Making iron brackets.
5. Connecting hose to heater and motor.
6. Drilling holes in iron brackets and tin case.

Bill of Material and Work Required to Make Heater:

1. Solder watertight compartments on each end of section of old radiator, as shown at D-1 in illustration.

2. Drill ½-in. holes for water connections, one in each water compartment, as illustrated at D-2.

3. Inclose radiator in tin case as views D-2, 3, 4 show. Develop tin case shown at D-5. Solder all seams securely.

4. Make brackets A and B shown at D-6 and locate on heater unit as views show.

5. Develop case and hood D-5. Inclose heater core as illustrated in D-2, D-3, and D-4.

6. Place bracket B-D-6 over front of case as shown at D-7, then place clamp A on back of heater and bolt through heater using 3/16 by 3-in. machine bolts.

Garden hose may be used to convey water from connection below water pump through heater, then to head of motor. The hose that conveys the water from heater back to motor is connected to motor block where the thermostat is located.

Development of Case D-5:

To get the true lengths of lines for hood on case D-5, take lengths from horizontal view, D-2, and set off on base line and connect to perpendicular height. These will be the true lengths of the lines.

Enamel case of heater black and attach to dash of car. The air current may be produced with an electric fan made from an old horn motor, or by attaching a metal tube running from just behind the car fan to the back of the case. The latter method is very satisfactory and is cheaper.

Width and length of heater may be changed as desired by making necessary changes in case.

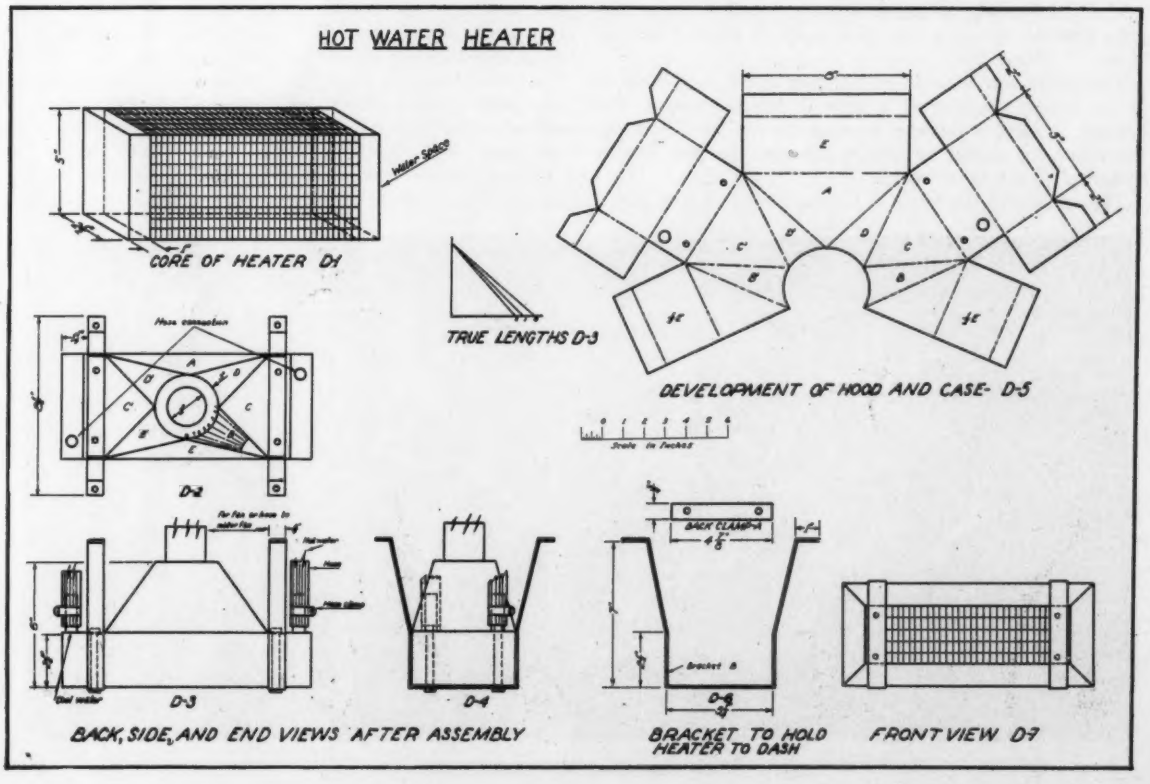
ELEMENTS OF JOB COMPOSITION—VIII

Frank P. Rich, Roxbury Memorial High School, Boston, Massachusetts

The Layout

The layout is the printer's "blue print," and it should be right in size and in all other details.

One of the first things to do in the production of a piece



of printing is to make a preliminary sketch or plan of the job that is to be composed. This is necessary in order that an intelligent idea may be formulated of what is wanted, and to make sure that all parts of the job may be appropriate, harmonious, and may bear the proper relation to each other. This plan also proves a timesaver, for often unsatisfactory features will appear in the layout which can be corrected very easily, but which would cause a great deal of extra work if not discovered until a proof of the type form has been obtained.

This method of making preliminary layouts may be compared to the work of the architect before the contractor erects a building. Both are very necessary in obtaining proper results in an orderly manner.

Make several rough layouts, using lines to indicate the proposed arrangement of the different parts of the copy, as shown in Figure 1. Specify the sizes of type, of all cuts, borders, and ornaments, before selecting any one layout. Be sure that the type sizes selected will fit the space allowed.

Use appropriate type faces. Roman type faces, such as are used in magazines and newspapers, are most familiar to readers, and therefore are the easiest to read. They should be used in most classes of work.

Remember, "type was made to read"; avoid freak arrangements that cause confusion. Be orderly. Make it easy for the reader to grasp the message you wish him to read.

Example

Copy for a business card, 2¼ by 4 in.: The Harmony Music Company. Music Specialists. Edison and Victor Records, Player Piano Rolls and Sheet Music; 21 Herald Square, New York. Telephone Connection.

Lines are used to indicate where the different parts of the copy are to be placed.

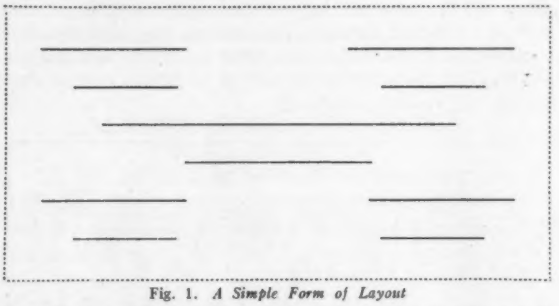


Fig. 1. *A Simple Form of Layout*

Edison and Victor Records — Player Piano Rolls Sheet Music

THE HARMONY MUSIC COMPANY

Music Specialists

Telephone Connection — 21 HERALD SQUARE NEW YORK

Fig. 2. *The Copy Set in Type According to the Layout*

CIRCULAR SAWS, THEIR CHARACTERISTICS AND USE—I

John E. Doren, Supervisor of Industrial Education, Eureka, California

Much of the misuse to which circular saws of small diameter are subject is due more largely to a lack of knowledge than to indifference. A knowledge of the design of the different types of circular saws used in our factories and shops, the work for which they are best adapted, and an understanding of how to operate and care for them are essential to the long life and general usefulness of the saw blades.

The purpose of the following notes and sketches is to present in a clear way such basic information as will lead to the wise and safe use of the saws. These notes have been prepared to meet a condition found to exist in many high-school shops, and in factories and industrial plants. The notes have been thoroughly tried out in the author's classes in advanced woodworking with regular high-school students, vocational students, and with adult workers from the local mills and factories. Two noticeable features that have resulted from a study of these notes and an application of the information are, the reduction of the cost of upkeep of the saw blades, and the increase in the production of high-grade work.

These notes deal with the fundamentals of saw design, the characteristics by which each type of saw blade may be identified, the range and character of the work for which different types of saws are suitable, and suggestions for their wise and safe use; namely, safety for the operator, safety for the work, safety for the saws. Through a wise selection and intelligent use of the best saw for the job in hand, the saws may be worked to their fullest capacity without danger of injuring them or increasing the cost of maintenance.

Section I
Important Characteristics for All Circular Saws

A. Saws must *run true* on the arbor when running at full speed.

1. The *Test.* Hold a piece of blue lumber crayon lightly against the side of the saw while it is running at full speed; begin by holding the crayon against the saw near the collar and slowly move it out to the rim.
   a) Blue spots *evenly distributed* over the side of the saw indicate that the saw is running true.
   b) Blue spots concentrated on approximately one half of the area of the saw indicate a wabble; it may mean a bent or buckled saw, or it may mean the presence of a lump of dirt or gum on the saw within the collar line, on the collars or on the washers. Before condemning such a saw, it should be removed from the arbor and thoroughly cleaned; the faces of the collars and the washers should be cleaned also, and the test repeated. The presence of small lumps of dirt or gum between the saw and collars has been known to make a perfect saw blade run with a wabble.
   c) Blue spots *concentrated in patches* indicate lumps in the saw blade that should be hammered down (see Fig. 1).

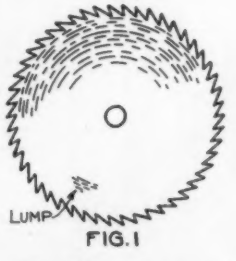


FIG. 1

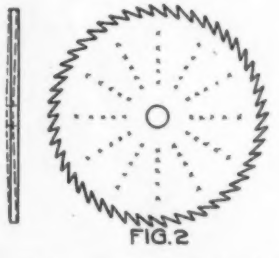


FIG. 2

The above tests may be applied to any and all circular saws whether rough rip, rough crosscut, hollow-ground or thin groover saws. In the case of hollow-ground saws or thin groover saws, any of the above defects will show up in inferior work.

Whether the saws are rough cutting, hollow-ground smooth cutting, or thin groover saws, they all must be stiff at the rim when running at full operating speed.

B. Saws must be *stiff at the rim.* They must *stand up* to the work and cut straight — they must not *snake* or *dodge* in a cut.

1. To make a saw stiff at the rim it must be hammered

uniformiy on both sides over the area between the collar line and the rim as indicated by the spots (X) in Figure 2. This hammering expands the metal, and if it is carried on far enough, the saw will snap back and forth at the eye like the bottom of an oiler; the saw will be concave on one side and convex on the other as indicated by the dotted lines. Though large diameter mill saws are hammered as above mentioned, it is never necessary nor advisable to hammer small diameter factory saws to this extreme condition.

(To be Continued)

MIMEOGRAPH SKETCHING TABLE

B. D. Elliott, Mason Intermediate School, Tacoma, Washington

Any available table may be used for making this handy mimeograph accessory. The first thing to do is to smooth the top of the chosen table and square up the left edge. Next, measure in 5 or 6 in., so that the supports are cleared, and mark off an 8½ by 14½-in. space. Cut out the piece marked, using a keyhole saw, and square up the edges with the left edge of the table. Cut a slot ⅛ in. wide, at a distance of ¼ in. from the top edge of the opening. This is for the back of the mimeograph sheet.

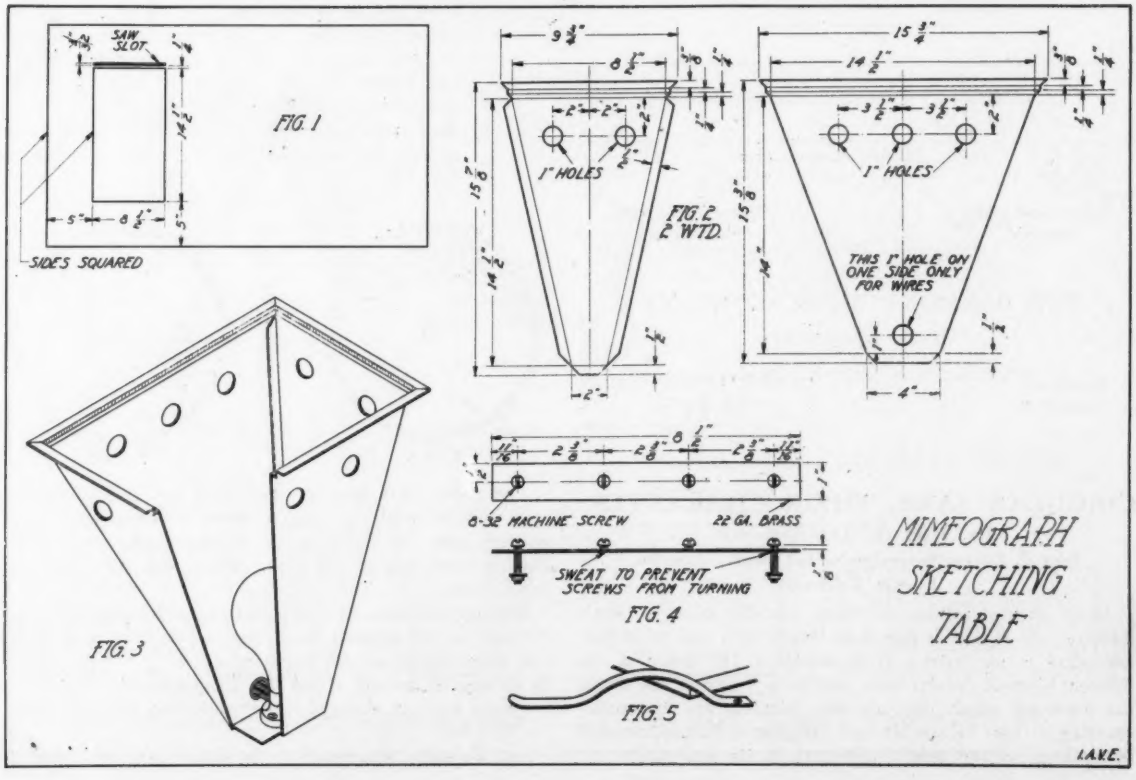
The next thing is to make the reflector. This should be at least 14 in. deep. The top is to be 8½ by 14½ in., tapering down to 3 by 4 in. at the bottom. Probably the easiest way is to make it in four sections, as shown in Figure 2. After the proper folds have been made, the pieces may be soldered or riveted together at the corners. A piece of 3 by 4 in. tin plate should then be fitted into the bottom where it also is riveted or soldered in place.

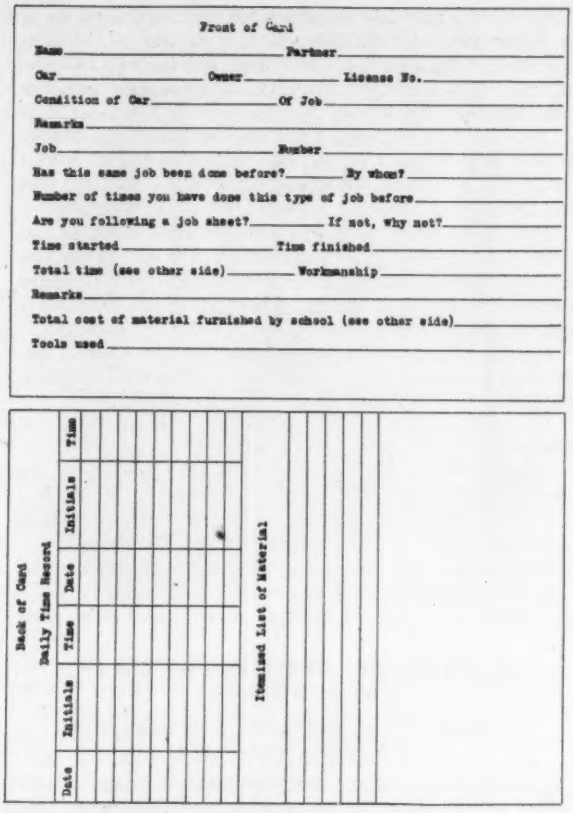
A standard porcelain light socket is then fastened to the base of the reflector with machine screws or stove bolts. The heat developed by the electric-light globe makes it necessary to punch ventilation holes in the side of the tin about 2 in. below the top. Four or more 1-in. holes will be sufficient for this purpose. A hole should also be punched into one side near the bottom for a Federal bushing, which is to insulate the extension cord where it comes from the light socket. Figure 3 shows how the reflector is assembled.

The next thing is to procure a piece of plate glass 8½ by 14½ in. It should be heavy plate, ground on both sides, and with smooth edges.

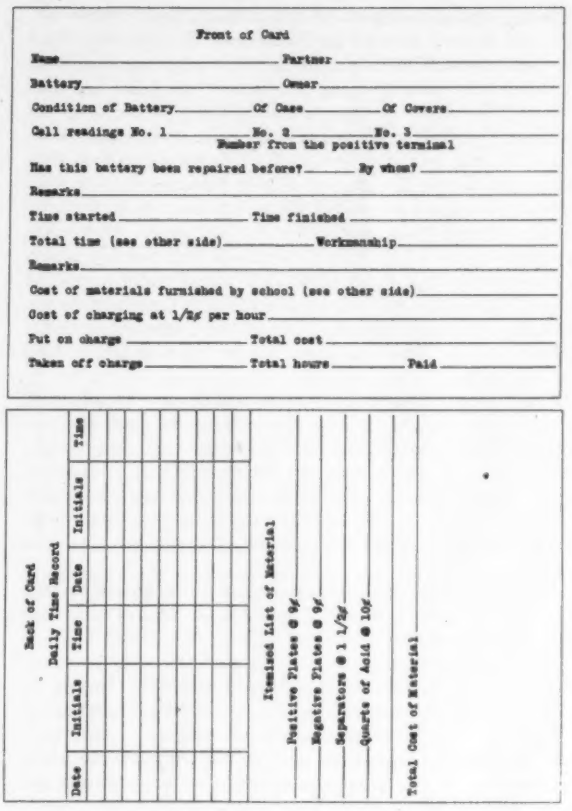
The completed reflector is then set into the hole cut for it in the table top. It is fastened down with brads. The ground-glass plate is then placed into the reflector. If the top of it is not quite level it can be raised slightly by placing drops of solder beneath in the groove in which it lies. A thin piece of brass, 5/8 in. wide, is tacked around the edges of the reflector to hold the glass in place. A strip of No. 22 gauge brass, 1 in. wide, may also be fastened down as a straightedge at the edge of the table. Holes for fastening the nails or screws should be drilled in this strip and the holes should be countersunk slightly so that the heads of the nails or screws may be filed flush in order that the T square may slip over the brass smoothly. Before it is permanently fastened it should be squared up with the mimeograph stencil.

The holder for the stencil is made of No. 22 gauge brass 1 by 8½ in. Figure 4 shows how it is made. The two outside screws are left long enough to go through the table top to fasten the holder in place. A little solder should be sweated around the screws at the bottom of the holders to prevent the screws from turning. This holder also should be squared up with a stencil in place before it is fastened to the table top. The wire from the lamp may now be brought out to a switch that is to be fastened beneath the table top and then an extension cord may be run from the switch to any convenient outlet. Two spring clamps, like the one shown in Figure 5, may be made of No. 22 spring brass. These clamps are about 3/8 by 6 in. An 8—32 machine screw may be used to fasten it to the table top. It is best to place a washer between the clamp and the table, so that the clamp may be easily rotated to fit the different stencils. The reflector may then be given a coat of black enamel and the brass a coat of clear lacquer. The inside of the reflector also should be given a coat of clear lacquer to prevent tarnishing.




Front of Card
Name Partner
Car Owner License No.
Condition of Car Of Job
Remarks
Job Number
Has this same job been done before? By whom?
Number of times you have done this type of job before
Are you following a job sheet? If not, why not?
Time started Time finished
Total time (see other side) Workmanship
Remarks
Total cost of material furnished by school (see other side)
Tools used
Back of Card
Daily Time Record
Date
Initials
Time
Itemized List of Material

JOB CARD FOR THE AUTO-MECHANICS SHOP, DESIGNED BY ELMER H. SCHULTE, LATROBE HIGH SCHOOL, LATROBE, PA.


Front of Card
Name Partner
Battery Owner
Condition of Battery Of Case Of Covers
Cell readings No. 1 No. 2 No. 3
Number from the positive terminal
Has this battery been repaired before? By whom?
Remarks
Time started Time finished
Total time (see other side) Workmanship
Remarks
Cost of materials furnished by school (see other side)
Cost of charging at 1/2¢ per hour
Put on charge Total cost
Taken off charge Total hours Paid
Back of Card
Daily Time Record
Date
Initials
Time
Itemized List of Material
Positive Plates @ 9¢
Negative Plates @ 9¢
Separators @ 1 1/2¢
Quarts of Acid @ 10¢
Total Cost of Material

JOB CARD FOR THE AUTO-ELECTRICAL SHOP, DESIGNED BY ELMER H. SCHULTE, LATROBE HIGH SCHOOL, LATROBE, PA.

ADJUSTABLE BOOKRACK

A Typical Operation Sheet

W. M. Phares, High School, Fort Dodge, Iowa

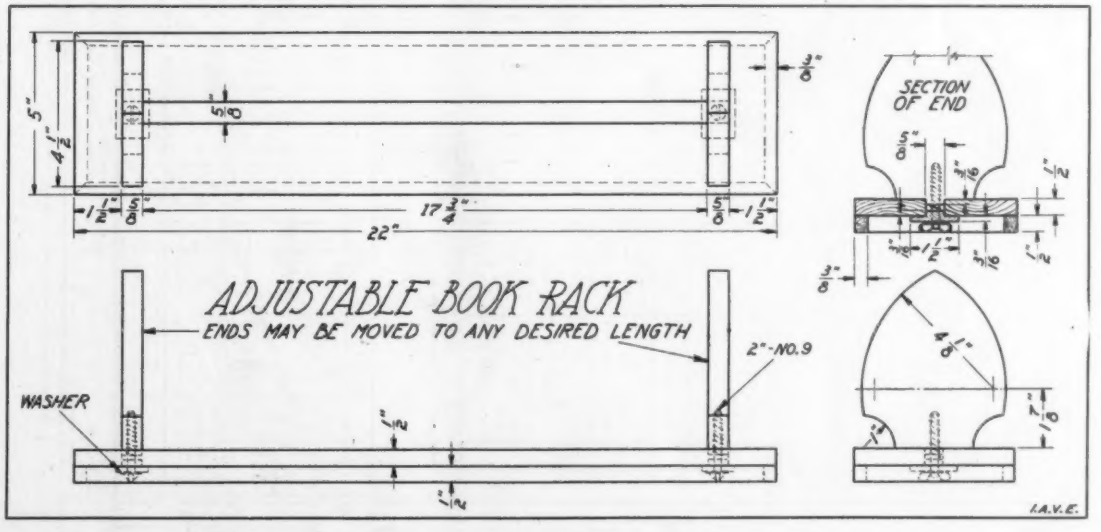
Job Specification: To make an adjustable bookrack.

Reason: Frequently a bookrack is desired for the study table or for the desk. The adjustable bookrack described herewith is so planned that it will hold several books, one book, or even a thin pamphlet in an upright position.

Materials: If the bookrack is to be used where oak predominates, then use oak, etc., but pine or basswood also may be used for this project. If either of the last named woods are used, the bookrack may be painted and transfers used on the ends. Besides the wood for the rack, the following articles will be needed: Two ¼ by 2-in. r.h. stove bolts, two ½-in. washers, and two ¼-in. polished winged nuts, a little glue, and a few brads.

Tools: A crosscut saw, ripsaw, plane, 1-in. chisel, brace, No. 10 auger bit, No. 7 wood drill bit, wood rasp, miter saw, and a hammer.

Procedure: Select a piece of the desired stock and shape it to ½ by 5 by 22 in., S4S. Into this, beginning 1 ½ in. from



each end, bore a succession of holes using a No. 10 auger bit. This will remove most of the wood from the slot into which the ends will fit. Now take a thin piece of some waste material and brad it temporarily along the edges of the holes and with a sharp 1-in. chisel remove the rounded part of the holes. In this way a straight-sided slot that is ½ in. deep, ⅝ in. wide, and 19 in. long, will have been used. With wood rasp and sandpaper smooth this slot so that it may be finished. Now take some of the same material but shape it to only ⅜ in. thick by ½ in. wide and 24 in. long, and make two pieces. Then make two pieces ⅜ by ½ by 6 in. These are to form the frame that is beneath the top. From these four pieces make a mitered frame that exactly fits beneath the top. Put some glue in the mitered joints and along the edge of the frame where it fits against the top. Brad the frame to the top with a few 1-in. No. 18 brads.

Next make the ends. To do this, square up two pieces of stock ⅝ by 4½ by 5½ in. Now comes the part that requires a little original thinking. The design that accompanies this project will do very nicely but you should, if possible, make a design of your own. If you use the design that is sent with this project, be sure to follow the figures carefully. Consult the instructor about any difficulty you may have. Do not guess at anything.

Be sure to notice that the ends are cut at the bottom so that a piece is left that is ⅝ by ⅝ by 3/16 in. This is to fit into the groove.

The little wood clips that fit beneath the ends are next. Take some ⅜-in. material and cut two pieces that are ⅜ by ¾ by 1 ½ in. and shape them as is indicated in the drawing.

Now take the ¼ by 2-in. r.h. stove bolts and with a hack saw remove the heads. Take them to the grinder or file them on the ends that you have cut so that they are rounded and somewhat pointed.

Now bore a hole into the end of the piece that is ⅝ by ⅝ in. which projects from the ends. Bore as deep as the bolts will reach. Take some glue and drop it into the hole and also dip the ends of the bolts into the glue and screw and force the bolts into the holes leaving ¾ in. projecting. Now bore a ¼-in. hole through the little wood clips and from the bottom fit them over the ends of the projecting bolts. Place a washer on the bolt and adjust the winged nut so that it will allow the end or ends to be moved.

It is not necessary that both ends are made movable, but it may be more convenient sometimes. If the one end is to be stationary it is suggested that it be made 5 in. long and have no projection on it and be fastened from beneath with No. 7 by 2-in. f.h. screws.

Answer the following questions and hand them in on a separate piece of paper when you hand in your finished bookrack. Be sure that your grade is entered on your grade card.

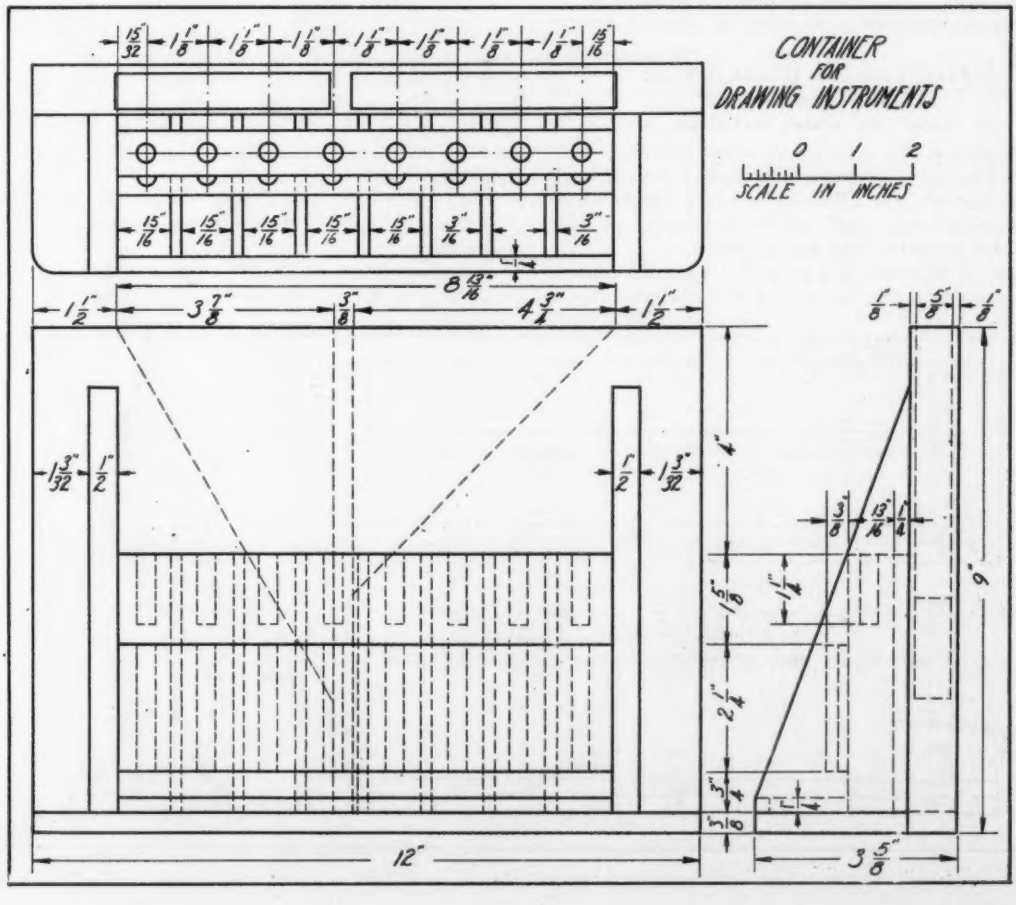
Questions:

1. What advantage has the adjustable bookrack over one that cannot be adjusted?
2. How does a stove bolt differ from a carriage bolt? from a machine bolt?
3. Why are miter joints used? Sketch a miter joint.
4. Did you design your own ends?
5. Is basswood a hard wood or a soft wood? oak? pine?

CONTAINER FOR DRAWING INSTRUMENTS

S. Gilbert Christine, Auden Reid Junior High School, Philadelphia, Pennsylvania

The drawing-instrument container shown in Figure 1 is designed to hold all of the instruments required by eight boys.



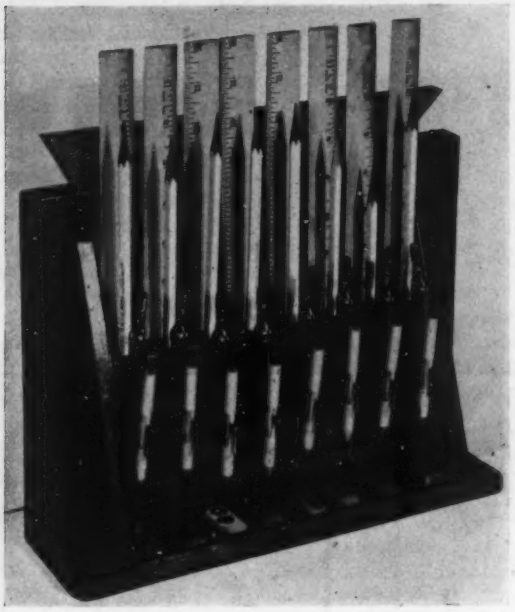
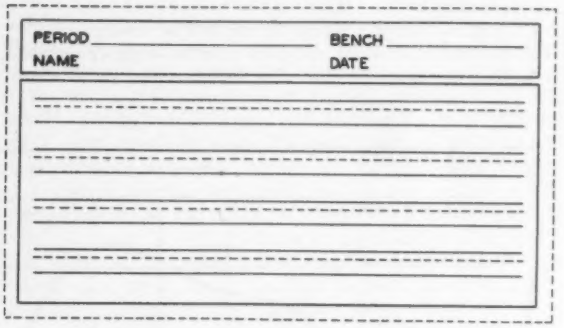


Fig. 1

This number was chosen because our drafting rooms are designed to hold 40 drawing tables — five rows of eight tables each. The container, therefore, is made large enough to hold the equipment for one row. The dimensions, shown in Figure 2, may therefore be altered to suit other conditions if that is found necessary. The triangle compartment of this container may be improved by placing a piece beveled at 45 deg. in a vertical position on each side of the center dividing piece. This will cause each triangle to stand a little higher than the preceding one, thus forming eight steps when all of the triangles are in place. This will make it easier to check whether all of the triangles have been returned at the end of the drawing period.

Bill of Material

1 pc.	13/16 x 4 5/8 x 8 13/16	Pencil compartment
1 pc.	5/8 x 6 1/4 x 8 5/8	Triangle compartment
1 pc.	5/8 x 5 3/8 x 8 5/8	Triangle compartment
1 pc.	1/2 x 3 x 8 3/4	Ribs (2)
1 pc.	3/8 x 5/8 x 8 5/8	Triangle compartment
1 pc.	3/8 x 2 1/4 x 8 13/16	Compass compartment
1 pc.	3/8 x 3 5/8 x 12	Bottom compartment
1 pc.	1/4 x 1/4 x 8 13/16	Eraser compartment
7 pc.	3/16 x 1/4 x 1 7/16	Eraser compartment
7 pc.	3/16 x 1/4 x 4 5/8	Rule compartment
2 pc.	1/8 x 8 5/8 x 12	Triangle compartment



RUBBER STAMP USED FOR QUICKLY PLACING GUIDE LINES FOR LETTERING THE TITLE ON MECHANICAL DRAWINGS. ORIGINAL IS 4½ BY 2¾ IN.
SUBMITTED BY R. R. BEDKER, WAUWATOSA, WIS.

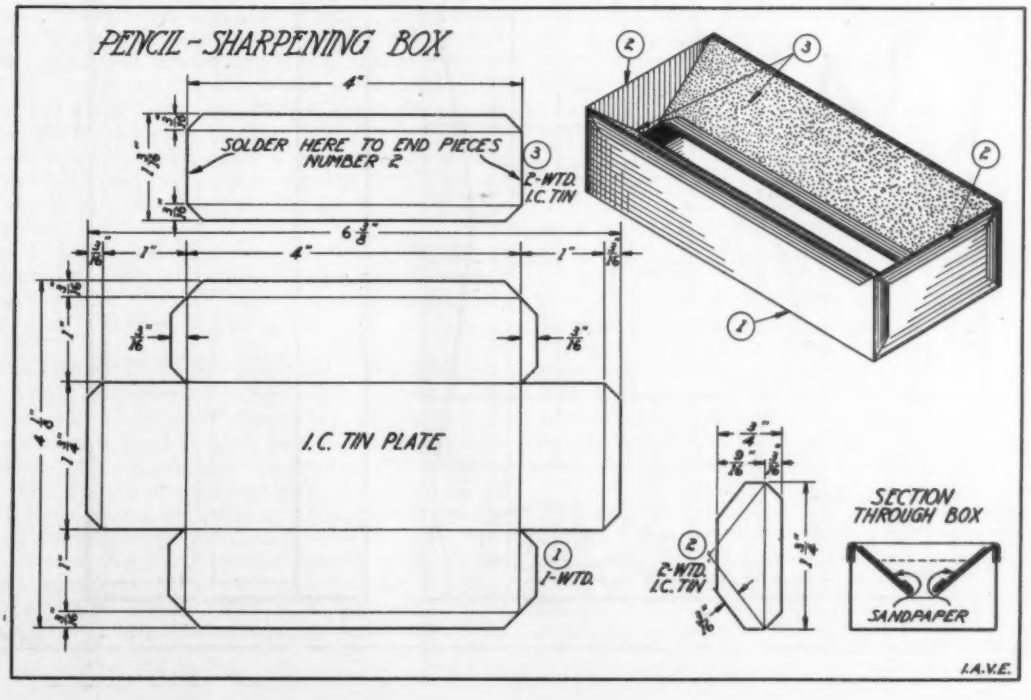
PENCIL-SHARPENING BOX

Harry W. Kroll, Independent School District No. 35, Buhl, Minnesota

The pencil-sharpening box described herein makes a very nice job for the sheet-metal shop.

The folds on the body of the box are to be made so that they come on the inside. The soldering flaps come on the outside at the ends. The method of making the removable top to which the sandpaper is fastened may readily be seen from the illustration.

The advantage of this pencil-sharpening box is that the lead from the pencil is deposited in the box rather than on the drawing board or on the floor. The top is made so that it can be lifted off readily in order that the lead may be deposited in the waste-paper basket.



THE "MONKEY SHINE" SHOE BOX

George E. Schuster, Gaskill Junior High School, Niagara Falls, New York

The "Monkey Shine" shoe-polishing box is a novel and attractive container for the shoe-polishing equipment. It occupies little space and is always handy.

This project involves experiences and practices in which the teacher desires the boy to participate.

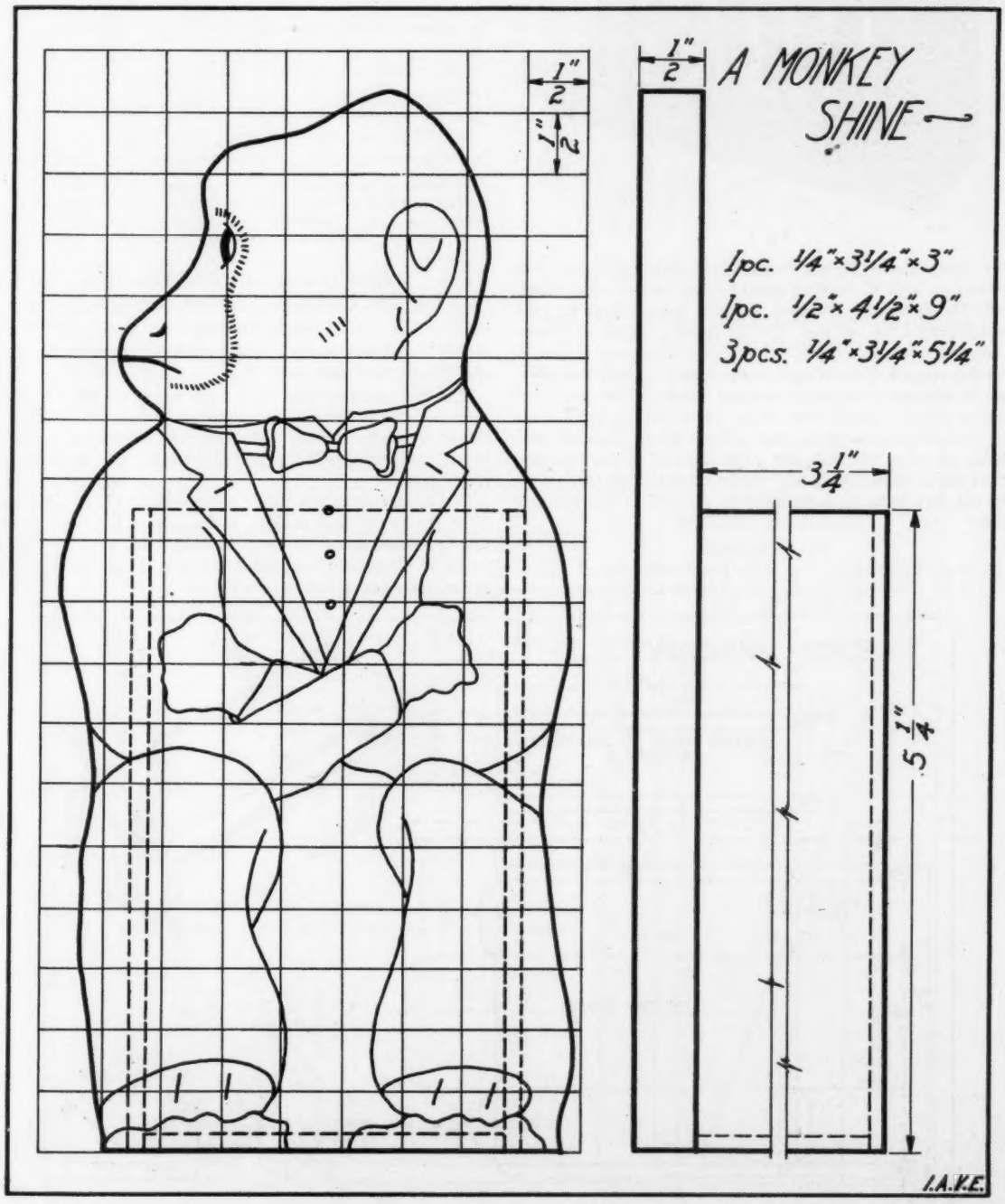
Learning Units

1. How to enlarge a design by method of squares.
2. How to select stock and place pattern correctly on wood.
3. How to cut an irregular line with a coping saw.

4. Simple box construction:
   a) Method of making similar pieces.
   b) Use of butt joints.
   c) Selection of proper brads.
5. Finishing pieces before assembling.
6. Lacquering — its use and application.

Construction

1. Select stock for front piece.
2. Lay out ½-in. squares on paper and trace pattern.
3. Cut pattern and transfer it to a piece of wood ½ by 4½ by 9 in.



4. Saw along outline with coping saw.
5. Smooth all edges.

Construct box

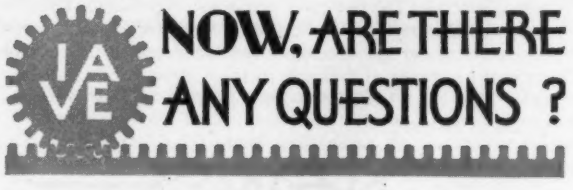
1. The box may be made from one long piece of wood ¼ by 3¼ by 19½ in. This allows for saw cuts.
2. Saw to lengths.
3. Plane ends smooth.

Assemble box

1. Use butt joints.
2. Use ¾ No. 20 wire brads.
3. Nail front pieces to box using 1¼ No. 20 wire brads.

Finishing

1. Apply one coat of Under-lac over entire project.
2. Use brushing lacquer and the following color combinations: Coat, tie, and face details, black; shirt and coat details, white; trousers, gray; face, hands, and feet, cinnamon brown.



A NEW TYPE OF TRANSFER

954. Q.: My father-in-law's brother, living in England, has a way of mounting halftone prints on a shellac-finished board in such a manner that the ink is transferred to the finish on the board and the result is a picture on the board, just reversed from the print on the paper.

I am not sure of all the details, but I think it is done in about this way: A white-pine board is carefully finished with three or four coats of white shellac to give it a bright, hard luster. Any magazine print can be used; it should have plenty of sharp detail. This print is soaked in denatured alcohol for a second or two and then pressed on the board, face down. After drying 24 hours, the paper is slowly and carefully washed away by using a small sponge or a small wad of cotton kept wet with cold water. The ink on the print is supposed to be transferred to the shellac on the board and will not wash away with the paper.

I have tried to do it in this way, but I have not had much success. If you know anything about the stunt, I shall appreciate any help you can give me. I think if it can be made to work, that it will interest boys in shop classes. — *H. J. P.*

A.: In view of the fact that I have never heard of this method of transfer being used, the best I can offer are suggestions for improving the results.

First, add about a teaspoonful of glycerin to a cupful of alcohol before using the latter to wet the print. This will slow up the rate of evaporation and should give a better impression.

Second, add a similar amount of pure turpentine to the alcohol; perhaps this will be of even greater value in making the print "let go" when it is removed from the shellac coating. — *Ralph G. Waring.*

BLUE-PRINTING TYPED MATTER

963. Q.: I am making a large number of blue prints for use in the shop and I wish to use a typewriter to do the lettering on the tracing. So far I have not been able to get any satisfactory results because the machine does not seem to make a heavy print that will print out legibly. The machine that I am using is a new one and the type is quite sharp. Could you offer any suggestions that might help me out? — *W. W. W.*

A.: It seems that your typewriter ribbon is not as fresh as it might be. You probably will get a much blacker impression if you use a fresh ribbon. You may also get a little heavier impression if you put another sheet of paper beneath the tracing so as to make a sort of cushion against which the type strikes.

Another method, and one which I am sure will solve your problem, is to place a piece of carbon paper immediately beneath the tracing with the carbon side toward the tracing. The impression of the type then, will show on both sides of the tracing and this will insure fairly good blue prints.

REWINDING MOTORS

956. Q.: I have a vacuum-sweeper motor wound for a 60-cycle, 110-volt alternating or direct current, that I would like to use in my shop if possible. As it is, it has too much speed and too little power.

Is there a practicable way in which I can change the field windings to reduce the speed and increase the power? About 1725 r.p.m. would be about the right speed. The field windings are easily accessible, though the rotor windings are not.

I shall appreciate very much if you will tell me if this change can be made, and if so, how. — *L. J. B.*

A.: In order to obtain a correct understanding of the problem involved in changing the speed or horse power of a motor, it is necessary to consider the motor as having been correctly designed by the manufacturer.

In motor design many factors are considered and mathematical calculations are carefully checked with test bench results in order to guarantee efficiency performance. Among these factors which determine whether a motor is to give either good or poor performance, are: the type of motor, the horse-power output desired, the voltage available, the current required, and the speed. Before actual construction can begin, one must know: (*a*) the quality of the steel to be used in the armature and frame, (*b*) the size and the number of turns of wire for the field and armature, (*c*) the size of the commutator bars to provide good commutation, and (*d*) suitable brushes to carry the current to the armature without undue heating.

Economy is naturally of prime importance in the manufacture of any product, so it is expected that the smallest size of wire and the minimum amount of steel have been used to meet the original specifications of current, voltage, speed, power, etc.

From the foregoing statement it is evident that any change which would necessitate a weaker field or less current in the armature or field would be feasible, but, on the other hand, any change which would require a stronger field and more current in the armature would be impracticable. (A slight change of 10 to 15 per cent has been provided for in the original design.)

The formula $HP = \dfrac{R.P.M. \times torque\ in\ ft.\text{-}lb. \times 2\pi r}{60 \times 33{,}000}$

indicates clearly that the horse power of a motor is proportional to its speed. This explains why it is possible to obtain considerable power from small high-speed motors. Where power and low speed are desired in portable equipment, it is generally advisable to reduce the speed through some train of gears or pulleys rather than through the motor design. Take some portable electric drills, for instance: Note the train of gears on the chuck end of the shaft. Why are these gears necessary? Should a motor be constructed to furnish the same power at the drill, with the required low speed and without the gear-speed-reducing attachment, its weight would be increased four or more times and would not be suitable for portable devices.

In general, the speed of a motor cannot be reduced without rewinding the armature and field, and then only at the sacrifice of power.

A further discussion of the mathematical calculations involved in motor design seem unnecessary in this connection, although if desired, reference may be made to any electrical engineering handbook. — *B. B. Burling.*

AMONG INDUSTRIAL-ARTS TEACHERS

¶ Mr. L. H. Funkey has been appointed as director of vocational education at Marinette, Wis. Mr. G. W. Schefelker, succeeds Mr. Funkey at Stoughton.

¶ Mr. Conrad A. Conkey has been appointed director of the Brewster Vocational School at Tampa, Fla., to succeed W. R. Scheel.

¶ Mr. William L. Ilgen. instructor in mechanical drawing and forging at the Crane Technical High School, Chicago, since 1905, retired on August 1 after 27 years of service.

¶ Franklin H. Gottshall, formerly of Boyertown, Pa., has accepted a position as director of industrial arts in the high school at West Lawn, Pa.

NEW PUBLICATIONS

Basic Units in Vocational Guidance

Cloth, 194 pages, 5¼ by 7¾. Price, $1.50. Published by McGraw-Hill Book Company, Inc., New York City.

The material in this little volume represents the coöperative effort of 25 well-known authorities on vocational guidance. It is a thought-provoking volume for the teacher preparing himself to become a vocational counselor. The entire field of vocational guidance is thoroughly covered and the appendix contains a comprehensive résumé of the principles and present practices in vogue in this country.

General Mechanical Drawing for Beginners

By Robert C. Woellner and Eugene C. Wittick. Cloth, 116 pages, 6⅛ by 9¼, illustrated. Published by Ginn and Company, Boston, Mass.

From the division of the book which includes lettering, sketching, several working drawings, inking, pictorial drawing, applied geometry, graphs and charts, developments, machine drawing, duplicating, map drawing, furniture drawing, architectural drawing, and symbols, it is readily apparent that the authors have briefly surveyed a wide field for the beginner in drawing.

Experimental Electricity

By Ralph H. Walters. Cloth, 145 pages, 5¾ by 8¼, illustrated. Price, $1.50. Published by McGraw-Hill Book Company, Inc., New York City.

This manual of experiments has been written for the engineering student of less than college grade. It contains experiments in both d.c. and a.c. electricity, and is well adapted for electrical students in the evening schools.

Guidance in Secondary Schools

By Leonard V. Koos and Grayson N. Kefauver. Cloth, 640 pages, 5½ by 8, illustrated. Price, $2.50. Published by The Macmillan Company, New York City.

This volume contains a comprehensive study of what is being done the country over in guidance work. The book is divided into four parts, the first of which is devoted to the subject of informing students concerning opportunities; the second shows how the information concerning students is secured; the third explains how guidance may be given to the individual student; and the fourth shows how guidance service in the school may be organized.

Mechanical Drawing

By Franklin D. Jones. Cloth, 342 pages, 6¼ by 9¼, illustrated. Published by The Industrial Press, New York City.

The author of this volume not only covers mechanical drawing in quite a general way, but also embodies in his book a description of the common practices in industrial drafting rooms. The work of the designer and the checker also are touched upon.

Gluing Wood in Aircraft Manufacture

By T. R. Truax. Paper, 57 pages. Bulletin No. 205, October, 1930. Price, 25 cents. Issued by the U. S. Department of Agriculture, Washington, D. C. The present bulletin offers specific information about the gluing of wood which is applicable to aircraft. The pamphlet discusses properties of aircraft glues, moisture-resistance, durability, tests for quality, preparation of wood for gluing, effect of assembly time and temperature, gluing of different surfaces, drying and conditioning of glue stock, together with a number of glue formulas for use in aircraft.

NEWS —— ——NOTES

New Buildings for Hershey Industrial School

Construction work has been started on a new group of buildings for the Hershey Industrial School at Hershey, Pa. The buildings will be erected at a cost of $500,000.

Vocational Guidance at Alva, Okla.

A comprehensive program of vocational guidance has been introduced at Alva, Okla., under the sponsorship of the local Kiwanis organization. The program was outlined by members of the vocational-guidance committee of the club and calls for the services of special contact men to assist students in shaping their careers. Meetings between pupils and counselors will be arranged and personal interest developed.

Indian Vocational School Open to White Boys

The Flandreau Indian High School at Flandreau, S. Dak., has admitted white boys from Moody county as vocational students. White boys who enroll in the trade courses will enter as day students and will be received on the tuition basis. The vocational department of the school is well equipped to offer a wide range of trade and agricultural subjects.

Vocational Workers to Meet in Biloxi

The fall conference of vocational and home-economics workers from twelve southern states will be held in Biloxi, Miss.

Offer Exploratory Course at Putnam Trade School

The state trade school at Putnam, Conn., offered an exploratory course during the past summer for boys over 14 years of age. The course is designed to be helpful to boys who have not selected a line of work which they desire to pursue and it aids the high-school coöperative student because it gives him an opportunity to become familiar with the nature of the work at the trade school before school opens in the fall.

School Reorganized as Vocational School

The Townsend Industrial School, of Newport, R. I., formerly conducted on the manual-training plan, has been entirely reorganized on a strictly vocational basis.

(Continued on Page 8a)

Rockford *Economy* Lathes Help Pupils, Teachers and Taxpayers

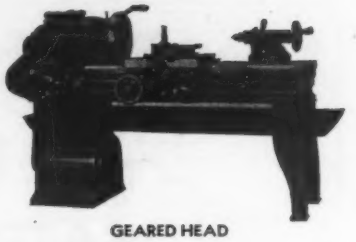
Rockford Economy Lathes are simple in design, safeguarded, and so easy to operate that pupils, generally, progress rapidly when these machines are available.

In addition to being accurate and durable, Rockford Economy Lathes are identical with those used by a large number of commercial tool and manufacturing shops—which helps substantially in teaching the theory and actual practice of modern metal turning.

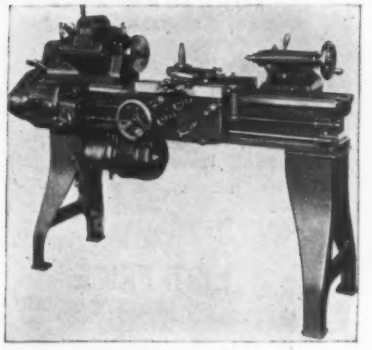
What about the taxpayers? Rockford Economy Lathes help them, too, because the remarkably low price of these machines represents a most thrifty investment of the taxpayer's money.

Rockford Economy Lathes are available in three types—cone-head; geared head; and the "Special," in which built-in motor-drive is standard equipment. In your next requisition for shop equipment, specify the type and size Rockford Economy Lathe which meets your needs.

Write TODAY for descriptions, data and prices.



GEARED HEAD



THE "SPECIAL"

ROCKFORD MACHINE TOOL CO.

. . . : LATHES . . SHAPERS . . SHAPER-PLANERS

ROCKFORD, ILLINOIS, U. S. A.

NEW BRITAIN STEEL EQUIPMENT FOR SCHOOL SHOPS

MANUALTRAINING BENCH NO. 91008

The "New Britain" line of Manual Training Benches has more than 75 different sizes and combinations available for your selection. *All steel* construction from floor to the laminated maple top.

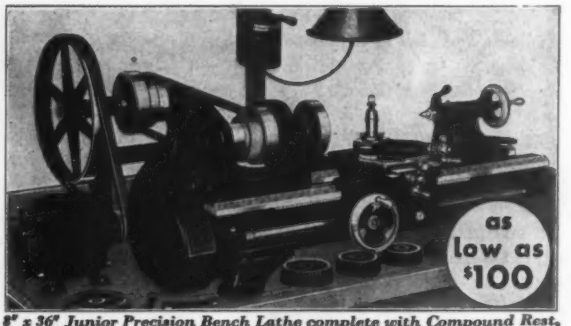
"New Britain" Drawing Tables are available in more than 50 sizes and arrangements, with adjustable or stationary tops, with or without individual lockers, general drawers, or board compartments. *All steel* construction from floor to the wood top.

DRAWING TABLE NO. 9660

SEND FOR OUR COMPLETE CATALOG

The New Britain Machine Company

"Shop Furniture Originators" NB **New Britain, Conn. U.S.A.**



8" x 36" Junior Precision Bench Lathe complete with Compound Rest, Motor, Reversing Switch, Wiring, Belts and Regular Lathe Equipment. Weight 275 lbs. Price **$148.25**

The Correct Size Metal Working Lathe for the School Shop

Recommended for the Machine Shop, Electric Shop, Auto Shop and General Shop, in Vocational, Senior High and Junior High Schools. The low price will permit the purchase of 4 to 6 lathes at the price formerly paid for one lathe. Built in Countershaft and Motor Drive, Bench and Floor Leg Models—bed lengths 24" to 48"—price $100 to $217.

Circular No. 8— describing 8" Lathes and attachments.

Circular No. 32— Manuals and blue prints for vocational school shop projects.

How to Run a Lathe— 30th edition, revised 160 pages, 300 illustrations.

Copies mailed free, postpaid, to instructors and supervisors. Write to

8" Junior Features

- Back geared headstock, provides 6 spindle speeds.
- Hollow steel spindle, ¾" hole.
- Reverse for feeds and threads.
- Graduated compound rest.
- Tailstock set-over for taper turning.
- Change gears for screw threads and automatic feeds.
- Automatic longitudinal screw feed to carriage.
- Precision lead screw.
- Cuts threads 4 to 40 per in.
- Many other features.

South Bend Lathe Works

133 East Madison Street South Bend, Indiana, U. S. A.

Lathe Builders for 25 Years—Over 55,000 Users

QUICK DRYING GUARDS AGAINST SMEARED DRAWINGS

POST'S
WATERPROOF DRAWING INK

LIST PRICE
25c
(¾ ounce bottle)

SPECIAL DISCOUNT TO SCHOOLS

THE FREDERICK POST CO.
P. O. BOX 803
CHICAGO, ILL.

(Continued from Page 312)

Appleton Included in Painting Circuit

Through the efforts of the vocational school, the city of Appleton has been included in the circuit for itinerant instruction in painting and decorating. The classes, which will be opened in September, will meet once a week for a period of eighteen weeks. Mr. L. H. Ewing, Green Bay, is the instructor.

Auto-Body Film for Educational Uses

"The Making of an All-Steel Automobile Body" is the title of a two-reel educational motion-picture film just prepared under the direction of the U. S. Bureau of Mines. The film shows the mining of iron ore, the smelting of the ore in blast furnaces, the conversion of the iron into steel, and the manipulations necessary before the steel may be used in the manufacture of various familiar objects, and in the all-steel automobile body.

The film may be obtained for exhibition purposes by schools, by applying to the Pittsburgh Experiment Station of the U. S. Bureau of Mines, Pittsburgh, Pa.

Changes in New York Trade Schools

Radical changes in organization and administration of vocational schools in New York City, as well as in their coöperation with industry, have been recommended in the recent report of the Vocational Survey Commission. Separate reports on each of the major industries in the city and on special phases of the educational program will be issued shortly.

The recommendations of the commission provide that all vocational schools in the city be placed in charge of one associate superintendent of schools; that vocational schools be on the same basis as the high schools and that such schools be erected in anticipation of the needs of the various centers; that a complete reorganization of the vocational-school classification be made in order that present industrial high schools and continuation schools be merged and reclassified as central special schools and local general schools; that an increase in the number of trade commissions be made until each of the principal industries is represented; and that a more effective vocational program be carried out.

Further coöperation between the board of examiners and the representatives of industry is to be promoted through trade commissions so that industry will not only stimulate the best type of men and women to apply for teaching positions, but will assist in the selection of those teachers by passing upon their trade skill.

SCHOOL SHOP EQUIPMENT NEWS

FOR THE SUPERVISOR OR TEACHER WHO DESIRES TO KEEP ABREAST WITH THE NEWS OF NEW MACHINERY, TOOLS, SUPPLIES, ETC.

CASCO GLUING GUIDE FOR SCHOOL SHOPS

A new gluing guide, just issued by The Casein Mfg. Company, 205 East 42nd St., New York City, contains within 47 pages over 50 uses for Casco glue. The book, which sells for 10 cents, tells how to do a number of jobs requiring the use of good glue, including the repairing of furniture, the cementing of linoleum, the mounting of wall coverings, the repairing of boats, the making of crack filler, and many other shop kinks in using a waterproof glue.

The Casco gluing guide is a most useful publication and should prove helpful in the school shop.

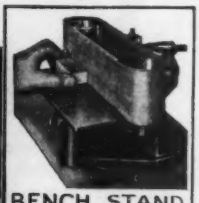
(Continued on Page 10a)

Dustless Sanding with the Dustless New! TAKE-ABOUT Sander

LEARN ITS MANY USES!

Ask for free bulletin showing work TAKE-ABOUT Sanders can do for you and your pupils—such as cabinets, boats, stairs, antiques, interior trim. When used with Bench Stand takes place of Disc and Spindle Sander. Belt insures smooth, straight grain finish. Handles like a plane, but effortless. Four models from which to choose. Write for no-obligation demonstration. Twenty other school machines.

PORTER-CABLE-HUTCHINSON CORP.
1702 N. Salina St.
Syracuse, N. Y.

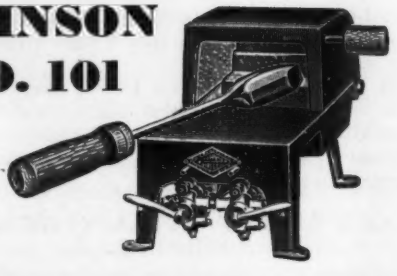


BENCH STAND

Pays for itself refinishing desks, blackboards. Your janitor can do it.

A Good Bench Furnace For School Shops

JOHNSON NO. 101



The Johnson No. 101 Bench Furnace has been a favorite in school shops throughout the country for many years. Its popularity is well deserved. Low in first cost—sturdy, dependable, and unusually efficient. Operates perfectly without expensive blower. Our catalog lists all standard gas burners and appliances.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Eastern Representatives:
R. M. Henshaw & Co., 250 Stuart St., Boston, Mass.
Steinmetz & Co., Inc., 220 So. 16th St., Philadelphia
30 Church St., New York

Sturdy Steel

Pat'd and Pat's Pending

Fig. 484 — "HALLOWELL" Bench-Leg of Steel, for steel and wood tops. Exceptionally rigid. 30 sizes.

The "HALLOWELL" Work-Benches of Steel are so popular because, unlike wood, they are strong, rigid, wobble-proof and easy to keep spotlessly clean in addition to being fire-proof and quite inexpensive.

And the "HALLOWELL" will last a lifetime and becomes, if anything, more serviceable with age.

To meet the constantly growing demand we carry 1368 different sizes and combinations of "HALLOWELL" Steel Benches in stock for prompt shipment.

We show below 3 of the 1368 combinations.

FULL DATA IN OUR BULLETIN 445

Pat'd and Pat's Pending

Fig. 732

"HALLOWELL" Work-Bench of Steel.

Made of hard, smooth steel throughout. Excellent metal-working Bench. Vise not shown. Drawer is extra. Fireproof. Finished in Olive green. Shipped from stock.

WRITE US.

Pat'd and Pat's Pending

Fig. 924

"HALLOWELL" Steel Work-Bench.

Laminated Hardwood plank in front. Very popular with Die and Tool makers. Vise not shown. Drawer is extra. Finished in Olive green. Shipped from stock.

WRITE US.

Pat'd and Pat's Pending

Fig. 928

"HALLOWELL" Steel Work-Bench.

Beautiful hardwood Top. Open below to facilitate sweeping. Vise not shown. Drawer is extra. Finished in Olive green. Shipped from stock.

WRITE US.

STANDARD PRESSED STEEL CO.

BRANCHES BOSTON CHICAGO DETROIT

JENKINTOWN, PENNA.
BOX 552

BRANCHES NEW YORK SAN FRANCISCO ST. LOUIS

FREE

September-October Issue

to every Instructor in woodworking

Would you like a beautiful colonial desk for your school office? Let us send you the working drawings and plans. In fact let us send the drawings, photographs, and descriptions of fourteen fascinating projects, plus a 17"x22" blueprint all contained in the September-October issue of The HOME CRAFTSMAN. This issue is a treasure chest of workable ideas for beginners as well as advanced craftsmen. Accept it with our compliments.

Here is a list of projects the September-October issue carries:

Colonial Desk
Fernery
Preserve Pantry
Card Table
Wall Book Rack
Boxes and Turnings
Kitchen Cupboard with Chairs
Pier Cabinet
Halloween Novelties
Smoking Stand

Send for your free copy using the coupon below.

The HOME CRAFTSMAN
Dept. S.O. PLAINFIELD, N. J.

I'll be glad to accept your offer of a free copy of the Home Craftsman without obligation.

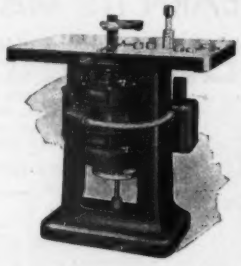
Name .....

Address .....

(Continued from Page 8a)

NEW LIGHT OLIVER SHAPER

The Oliver Machinery Co., of Grand Rapids, Mich., has announced the marketing of their new No. 285 high-speed, ball-bearing shaper. This small, light shaper retains all of the advantages of their larger and heavier spindle shapers.



THE NEW OLIVER SHAPER

The No. 285 shaper is intended for a large variety of shaper work which does not involve heavy-duty production work. The shaper is well designed, rigid, and sturdy, and especially suited for school woodworking and patternmaking shops.

The machine may be obtained with the motor-on-arbor drive and also in the V-belt motor-driven type. With three-phase, 60-cycle, 220-volt current, the spindle will operate at a speed up to 10,500 r.p.m.

The machine is equipped with an effective and simple shaper guard to protect the operator from running his hand into the cutting knives while feeding the stock. It also is provided with a spindle brake so that the machine can be stopped immediately after the current is shut off. The ball bearings are automatically lubricated and automatic push-button remote control with low-voltage protection and overload relay is mounted on the machine.

Complete information may be obtained upon request.

OSAGE ARCHERY SUPPLIES FOR SCHOOLS

The Outdoor Amusement Company, Clinton, Mo., has just issued its 1932 catalog, containing descriptions and illustrations of its complete line of archery supplies for schools and colleges.

The catalog lists bows and arrows, targets, arm guards, arrow quivers, staves, arrow points, and miscellaneous supplies.

A copy of the catalog will be sent to any school-shop instructor who requests it.

NEW SELLEY CATALOG OF MODEL AIRPLANES

The Selley Mfg. Company, Inc., 1377 Gates Ave., Brooklyn, N. Y., has just issued a 32-page booklet, illustrating and describing its line of model airplanes and accessories for school-shop use.

The firm also carries a line of special 2-in-1 kits for use in constructing flying models of airplanes.

Complete information may be obtained by any school-shop instructor who requests it.

BEHR-MANNING TAKES OVER NORTON PIKE PRODUCTS

The Behr-Manning Corporation, Troy, New York, has taken over the sales and distribution of Norton Pike products in the United States. This firm, which has been affiliated with the Norton Company for some time, maintains factories, laboratories, and offices at Troy, and also has branch offices and warehouses in all of the large cities.